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National Forest
Santa Lucia
Ranger District

Draft Environmental Impact Statement

Lomex Corporation's Proposed Mineral Explorations in the Navajo Vicinity

San Luis Obispo County, California

1950
2810

24500

ENVIRONMENTAL IMPACT STATEMENT

Lomex Corporation's Proposed Mineral Explorations in the Navajo Vicinity

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Abstract: This Environmental Impact Statement is in response to Lomex Corporation's proposed Plan of Operations for geotechnical drilling to explore for minerals on 385 acres (156 hectares) of National Forest System Lands in the Navajo area of Los Padres National Forest, San Luis Obispo County. The five alternatives are:

(1) No Action on the Part of the Forest Service

(2) Recommendation of Emergency Withdrawal of the Subject Land from Mineral Entry

(3) Approval of Lomex Corporation's Proposed Plan of Operations

(4) Approval of a Modified Plan of Operations with Mitigation Measures (the Forest Service Preferred Alternative)

(5) Approval of a Modified Plan of Operations with Additional Geophysical Study.

SUMMARY

This Draft Environmental Impact Statement was prepared by the Forest Service, Department of Agriculture, with cooperation and advice from other Federal agencies and governmental units of the State of California, San Luis Obispo County, and Monterey County. The DEIS is prepared in compliance with the National Environmental Policy Act (NEPA) and will be used in conjunction with other public laws, regulations and policies to make a decision. These laws, regulations and policies include the General Mining Law of 1872, the 1897 Organic Act, the Multiple Use Mining Act of 1955, the Multiple Use Sustained Yield Act of 1960, the Federal Land Policy and Management Act of 1976, and the Forest Service Manual 2801.

The Lomex Corporation's proposed action is the approval of a Plan of Operations for implementation of a program of mineral exploration. The exploration consists of exploratory drilling of mineral deposits located in the Navajo area of Los Padres National Forest, San Luis Obispo County, California. The mineral deposits are known or expected to contain uranium, gold, and other potentially valuable minerals. The proposed exploration would require approximately one month during the summers of each of three consecutive years. Exploration by drilling would take place within three separate sites, with a total of 145 drill holes proposed.

A number of major public issues, management concerns, and opportunities have been raised during the scoping process by private and public individuals, agencies, and organizations.

- Adverse impacts from mineral exploration
- Protection of health and safety of local residents
- Development of mitigation measures to protect the environment
- Ground and surface water contamination, downstream effects, and soil erosion
- Disturbance to wildlife, vegetation, and threatened, endangered, or sensitive species
- Adverse social or economic impacts to local residents
- Adverse impacts to cultural and historical resources
- Responsibility for problems resulting from exploration

The range of alternatives was developed on the following considerations: applicable law and regulation, practical and feasible operations, pertinent environmental facts and scientific data, and the authority and responsibility of the Forest Service. The alternatives are:

(1) No Action on the Part of the Forest Service

(2) Recommend Emergency Withdrawal of Subject Land from Mineral Entry

(3) Approval of Lomex Corporation's Proposed Plan of Operation

(4) Approval of a Modified Plan of Operations with Mitigation Measures (the Forest Service Preferred Alternative)

(5) Approval of a Modified Plan of Operations with Additional Geophysical Study

The following summarizes environmental effects:

ALTERNATIVE ONE: No Action on the Part of the Forest Service

If the Forest Service chose "No Action" on the Proposed Plan of Operations, the Lomex Corporation could proceed with mineral activity due to their statuatory right to explore under the General Mining Law of 1872. The environmental effects of proceeding with the proposed Plan of Operations would be the same as those effects listed under Alternative Three.

ALTERNATIVE TWO: Recommend Emergency Withdrawal of Subject Land from Mineral Entry

The outcome of a Forest Service recommendation for withdrawal would depend on actions by Congress and the Secretary of the Interior. If the withdrawal were successful and if the Lomex Corporations claims were condemned or were not validated, there would be:

no effect on air quality, water quality or quantity, geology, soils, vegetation, wildlife, the natural radiation environment, the social environment, the Black Mountain Further Planning Area, archaeological and historical values, and noise. No information would be obtained on the groundwater mineralization or geology of the project vicinity. Opportunities for employment in potential mineral development would be foregone, as well as the opportunities to tax the possessary right attached to unpatented mining claims. Recreational gold panning would be eliminated since the area will be withdrawn from mineral entry. No change would occur in existing visual quality or wildfire situation.

ALTERNATIVE THREE: Approval of the Lomex Corporation's Proposed Plan of Operations

There would be small amounts of pollution from fumes and dust, but these would not violate National

Ambient Air Quality Standards. A total of 30,000 gallons (104,000 liters) of water would be pumped from the underground aquifer. There would be a possibility of deleterious surface runoff entering into the groundwater via the drill holes. In the unlikely event of interaquifer exchange of deleterious water, a long term direct impact on water quality would result. Groundwater pumping may introduce deleterious water into stream channels. Approximately 6% of the cuttings removed from each drill hole may exceed background radiation level. There would be development of information on geology, mineralization and groundwater. A very small increase in fracture surface area would occur and there would be a small amount of relocation of rock. Soil erosion and sedimentation would increase slightly. Most wildlife would avoid the project area during operations. There would be no effect on threatened, endangered, or sensitive species. There is the possibility of unacceptable increases in radionuclides in drillsite vegetation. Gas dispersion would dilute the small amounts of emanated radon to background levels at short distances from the sources. Gamma ray exposure would not exceed the occupational exposure guide even in the worst case. Effects on social and economic environment are expected to be transitory; there may be some interference with some religious practice and there could be slightly increased emigration from the Red Wind Community. Effects on recreation will be minimal and transitory; the impact of noise on deer hunting could result in decreased hunter success during the project duration. The Black Mountain Further Planning Area would not be excluded from wilderness consideration since mineral exploration is permitted. There would be some change in visual resources and vegetation clearing and pad construction would be noticeable. There is the potential to directly disturb archaeological and historical values from vegetation clearing, drilling operations, and off-road movement of machinery. Noise levels will be temporarily elevated during project operations. The probability of wildfire will be increased.

ALTERNATIVE FOUR: Approval of Modified Operating Plan, the Forest Service Preferred Alternative

There would be small amounts of pollution from fumes and dust but these would not violate National Ambient Air Quality Standards. A total of 30,000 gallons (104,000 liters) of water would be pumped from the underground aquifer. Sanitary seals and proper abandonment procedures would reduce or eliminate the possibility of the mixing of deleterious surface runoff with groundwater via the drill holes. If more than one aquifer exists, zones of deleterious water would be isolated and State of California standards would be used for sealing off strata. Discharge requirements would lessen or avoid the possibility of deleterious water entering into stream channels. Any cuttings that exceed the U.S. Environmental Protection Agency interim Federal Standards for remedial action concerning uranium mill tailings will be managed according to the cuttings management plan to reduce the hazard of exposure. Information would be developed on geology, mineralization, and groundwater. A very small increase in fracture surface would occur and there would be a small amount of relocation of rock. Mitigation measures would reduce the small amount of erosion and sedimentation loads that would occur with the project. Most wildlife would avoid the project area during operations. There would be no effect on threatened, endangered or sensitive species. Levels of radionuclides in drill site vegetation would be kept down by following the EPA interim Federal guidelines for uranium mill tailings and the cuttings management plan. Gas dispersion would dilute the small amounts of emanated radon to background levels at short distances from the source. While gamma ray exposure would not exceed the occupational exposure guide even in the worst case, the cuttings management program would mitigate any adverse impacts of radioactive cuttings. Effects on the social and economic environment are expected to be transitory; there may be some interference with religious practice and there could be slightly increased emigration from the Red Wind Community. Effects on recreation would be minimal and transitory; the impact of noise on deer hunting could result in decreased hunter success during the project duration. The Black Mountain Further Planning Area would not be excluded from consideration as wilderness since mineral exploration is permitted. Visual impacts could be reduced through mitigation measures; mitigation measures include provisions for pad construction, vegetation clearing, drill site abandonment, and trash and debris disposal. Archaeological and historical sites would be avoided thus eliminating impact to cultural resources. The nuisance value of noise during project operations would be reduced by restricting operating hours; this would result in a slightly longer duration of operations. A fire plan would reduce the possibility of wildfire.

ALTERNATIVE FIVE: Approval of Modified Operating Plan with Additional Geophysical Study

Alternative Five would follow the same program of mitigation and avoidance developed for Alternative Four, except that up to thirty more holes would be drilled for additional study. These holes would be constructed and abandoned according to the specifications developed for Alternative Four. The environmental effects for Alternative Five would be the same as for Alternative Four except that: there would be a slightly greater increase in the total amount of dust and fumes; there would be a slightly greater amount of rock removed and a slightly greater increase in fracture surface area; there would be a considerable increase in information of the geology, mineralization and groundwater; there would be slightly greater amounts of cuttings and radon emanation from drill holes; there would be an extra year of drilling to do the study and thus there would be slightly greater impacts on visual quality; and there would be four seasons of noise from operations rather than three.

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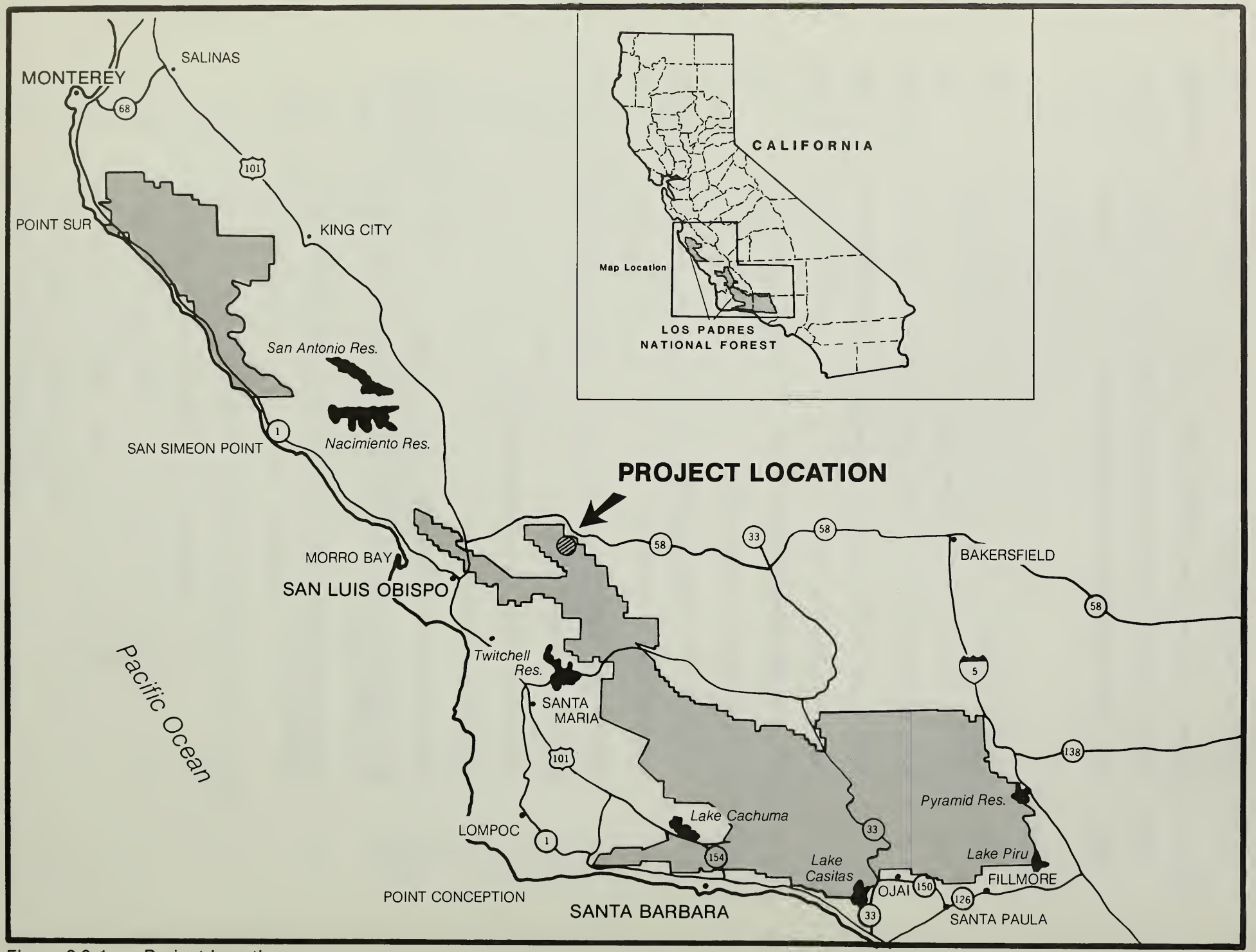


Figure 2.0-1 Project Location

2.0 PURPOSE AND NEED

2.1 PROPOSED FEDERAL ACTION

This Draft Environmental Impact Statement (DEIS) was prepared by the U.S. Department of Agriculture, Forest Service, with the cooperation of Federal, State, and local agencies. The DEIS is in response to an operating plan (Appendix A) submitted to the Forest Service by the Lomex Corporation for mineral exploration in the Navajo area of San Luis Obispo County. The proposed mineral exploration consists of a three year program of geotechnical drilling in three separate prospects. A maximum of 145 exploration holes would be drilled on 385 acres (156 hectares). Figure 2.0-1 shows the general location of the project.

The Federal administrative action considered in this DEIS is approval by the Regional Forester, Pacific Southwest Region, of the Plan of Operation submitted by Lomex Corporation.

This DEIS is prepared by the Forest Service in compliance with regulations governing implementation of the National Environmental Policy Act (NEPA). NEPA procedures are used to prepare an environmental impact statement (EIS) of a proposed action and alternatives to the proposal. Environmental Impact Statements are used by Federal officials in conjunction with other relevant materials to plan actions and make decisions.

The primary purpose of preparing an EIS is to aid agency decision making. To this end, the Council of Environmental Quality's (CEQ) regulations for implementing NEPA direct that Federal agencies:

- interpret and administer the policies, regulations, and public laws of the United States in accordance with the policies of NEPA and CEQ's regulations
- write environmental impact statements that are concise, clear and to the point which
- integrate the requirements of NEPA with other planning and environmental review procedures required by law or agency procedure
- use the NEPA process to identify and assess the reasonable alternatives to proposed actions.

Any individual or group has the statutory right to explore for minerals on National Forest System Lands under the General Mining Law of 1872. This law and other mining laws (30 United States Code 21-54) confer a statutory right to enter upon public lands to search for minerals. Prior to September 1, 1974, persons exercising this right in the National Forest were not required to give any notice to Forest Service officials of their activities. Effective that date such persons were, and are now, required (by 36 Code of Federal Regulations 252) to provide the Forest Service with a plan of operations if their activities will result in a disturbance of surface resources.

It is the policy of the Forest Service to integrate mineral activity with the use and conservation of all other Forest resources to the extent possible under laws governing mineral disposal (Forest Service Manual 2801). The principal authorities for regulating the broad provisions for mineral entry provided for under the general mining statutes are such environmental protection laws as the National Environmental Policy Act and such laws governing land resource allocation and use as the Federal Land Policy and Management Act of 1976.

The Forest Service, under the 1897 Organic Act, the Multiple Use Mining Act of 1955, and the Multiple Use Sustained Yield Act of 1960, administers the surface uses and resources of the National Forest System, including administration of mining claims located on National Forest land under the General Mining Law of 1872. Surface resources managed by the Forest Service include ground water. All aspects of the proposed operations, as they affect surface resources, are subject to approval of the plan of operation by the Forest Service.

The responsibility of the Forest Service is to analyze the effects of the proposed action and alternatives to it and to identify mitigation measures. The Federal response is limited to actions permitted by the Forest Service rules concerning mineral activities (36 Code of Federal Regulations 252). These rules permit the Forest Service to:

- determine whether an operating plan is required
- approve plans of operation
- defer approval of plans of operation on proper grounds
- require changes in plans of operation
- provide appropriate review, including environmental analysis, if necessary.

The Forest Service can only approve the Plan of Operations as approved or approve it with reasonable modifications deemed necessary to minimize adverse environmental impacts on National Forest surface resources. The option of rejecting a plan of operations outright is not enumerated in the regulations.

2.2 BACKGROUND

The Lomex Corporation, a mineral exploration company subsidiary to Caithness Corporation, has systematically explored for minerals by drilling and surface geophysical assessment in the Navajo area

since 1971. Prior to that date similar mineral explorations, primarily for uranium, had been conducted in this area by other mineral firms. Exploration for and mining of uranium was done in the Navajo area by small, independent miners during the mid-1950s. The current proposal (Appendix A) is for exploration for valuable minerals on existing unpatented mining claims in the Navajo area of the Santa Lucia Ranger District. Included among the minerals of interest are gold, uranium, and rare earth elements.

Lomex Corporation submitted the current operating plan for mineral exploration on 31 March 1980. This operating plan has been amended or clarified in subsequent correspondence and other contacts. The original operating plan called for a one-year program of geotechnical drilling and construction of an access road. This plan has been amended by Lomex Corporation as follows (refer to Appendix A):

- The proposed one-year program was expanded to the three-year program. The expanded program brings the operating plan to the limit of the "foreseeable future", thus providing an empirical basis for evaluation of cumulative effects

- The proposed temporary access road to the exploration area situated in T. 29 S., R. 16 E., MDM. Section 18, has been eliminated.

On 15 July 1980 the Forest Supervisor made the decision to require an Environmental Impact Statement because of

- the potential for public conflict.

- a desire to provide a greater opportunity for public involvement in the identification of issues (scoping).

Although unresolved technical issues concerning the significance of potential impacts were also in question, these could have been addressed equally well in an Environmental Assessment (EA).

The Lomex Corporation holds a large block of claims on Los Padres National Forest, 22 miles east northeast of San Luis Obispo, California. Approximately 1140 acres (461 hectares) are currently encumbered by such claims. The proposed project is situated in three separate localities within this block. No project elements are situated on private land or lands administered by other government agencies. The proposed project is to take place during an approximately one month long field season in the summers of three consecutive years. The principal objective of the project is to develop information on mineral resources of the area. Since (1) no development or production is proposed and (2) any future development is contingent on a host of parameters including information on proven mineral resources, this environmental impact statement is limited to the proposed action. Potential future exploration development and production is addressed in general terms in Section 2.2.1 of this environmental impact statement.

The location of the project is shown in Figure 2.0-1. The proposed exploration is situated in the La Panza range at an approximate mean elevation of 2000 ft. The principal drainages are Camatta and Navajo Creeks, which are both tributaries of the Salinas River.

Available data suggest that gold, rare earths, and uranium occur throughout the project area. Several zones of uranium mineralization are known. These include:

- The Navajo mineralized zone - a deposit trending approximately east-west through the area at the confluence of McGinnis and Navajo Creeks

- The McCoy mineralized zone - a deposit in Sections 18 and 19, T. 29 S., R. 16 E., including the old Bethel Ranch.

2.2.1 Potential Future Mineral Development

The proposed Plan of Operation considered in this environmental impact statement is limited to mineral exploration. The Caithness Corporation has specifically excluded development and production from the proposal. However, mineral activity occurs in sequence and it is prudent to maintain an awareness of potential mineral futures. The following overview describes potential future mineral activity in or adjacent to the project area.

Mineral activity generally occurs in sequence. "Mineral exploration," such as is currently proposed by the Lomex Corporation, is the identification and description of areas of potentially economic mineral deposits. Once such discoveries are made, "development" is undertaken to prepare an economic mineral deposit for "production." Production refers to mining, processing, and shipment of minerals. Refining, smelting, and other similar processes usually take place away from the production site and are excluded from this overview.

Typically the full sequence of mineral activity will occur for only a few projects. Since economics are a governing concern in mineral programs, projects are abandoned if results from any stage indicate an unprofitable venture. Nationwide statistics indicate that 80% or more of all mineral projects (except oil and gas) which involve detailed exploration programs are neither immmediate nor "technical" (i.e., uneconomic discoveries of potential value if technology, infrastructure, or market conditions improve) successes (U.S. Congress, Office of Technology Assessment 1979).

For the purpose of this overview, potential future actions in or near the project area are:

- additional mineral exploration

. abandonment of further interest in minerals

. development

. production.

2.2.1.1 Further Exploration

There is a definite possibility that additional exploration would be done by the Lomex Corporation or other mineral firms on Navajo area claims. Although previous reconnaissance and exploration have caused corporate attention to focus on the three areas involved in the current proposal, the results of the proposed exploration program could trigger additional exploration. Such exploration may include further geotechnical drilling, recovery of bulk samples and ore dressing tests, investigation of suitability of water and topography for development or production, and feasibility or pilot studies.

Each of these potential activities may have environmental effects. Among these effects may be radiological exposure, air pollution, surface and groundwater pollution and contamination, soil erosion, damage to vegetation, restriction of recreation or other human uses of the land, and public issues concerning radiological hazards.

The nature and extent of potential effects would depend on the scope of the exploration activity proposed. The scope is dependent on the nature of the plan of operation submitted by a mineral firm to the Forest Service. Since no further plans of operation have been submitted at this time, the potential for further exploration has not been estimated. The quantity and quality of uranium and other minerals in the area are not known.

2.2.1.2 Abandonment of Mineral Interest

The known ore values for uranium in the project area are presently uneconomic to develop according to the Lomex Corporation. If market conditions fail to improve and/or if exploration fails to indicate the presence of higher grade uranium deposits, it is possible that further interest in the area will be abandoned.

The potential of the area to produce other minerals of interest, particularly gold and rare earths, will be explored through the proposed program. Should these minerals be unprofitable to develop, it is possible that further interest in them will be abandoned. On the other hand, if market conditions and development costs improve, and/or if economic deposits are discovered, development of ore deposits may be undertaken.

2.2.1.3 Development

Development might result from the detailed investigation produced by the proposed exploration program. Such development might consist of further drilling to block out the deposit or to construct production wells. In addition, mine workings, plants, facilities, roads, powerlines, and pipelines might be constructed. Development is focused on the land overlying the mineral deposit of interest and other land required for support.

Development may result in the kinds of impacts listed for the exploration program. However, these effects may have more impact and will probably be more localized than with the exploration program. In addition, development will probably lead to socioeconomic changes in the area, since jobs will be created, population might increase, with commensurate strains on public facilities, housing, and health facilities and opportunities for commercial support services and taxation.

2.2.1.4 Production

Production refers primarily to the operation of a mine, such other production means as wells for in situ leach processes, and related production facilities. Mining options which might be feasible in the Navajo area include in situ leaching, open-pit mining, and underground mining. The mineral or minerals of interest would be removed from mined ore to form final concentrates of relatively high purity. Such removal might be accomplished by heap leaching or milling. Heap leaching involves dissolving minerals with a solution (gold is dissolved with a sodium cyanide solution, uranium is dissolved with an ammonium carbonate/bicarbonate leachant or by microbiological leaching). Milling is a process whereby materials of interest are recovered by several stages of selective precipitation.

The potential hazards of mining are greater than the hazards associated with the preceding stages of mineral activity. This greater potential is the result of the greater scope, length, and intensity of mineral activity in mining as compared with other stages. The following brief overview concentrates on radiological hazards since they are the focus of greatest public concern.

Open-pit and underground mining pose hazards for the work force, primarily abnormal cytology. In open-pit mining, gamma radiation and uranium dust are the greatest hazards, while hazard from exposure to radon and radon daughters is negligible (Miller 1977). Conversely, work force hazard in underground mines is derived primarily from radon daughters producing alpha radiation. Gamma radiation tends to become a factor in areas of high grade uranium ore (0.4% U_3O_8). Environmental hazards associated with all mining of radioactive materials include (but are not limited to) dewatering of aquifers, radionuclides in mine water leading to groundwater and surface water contamination, and cuttings or tailings. Other effects include damage to surface resources and social and economic changes.

2.2.2 The Interdisciplinary Team and County-Level Involvement

An interdisciplinary team was formed to develop technical environmental studies and to prepare the environmental document on the mineral exploration proposal. The Forest Service and its cooperating agencies have completed a one and one-half year study on the project area. The names and qualifications of the technical staff that developed the information used in this DEIS are included in Chapter 6, "List of Preparers."

Some participants in the scoping process asserted the right of the County of San Luis Obispo to require Lomex Corporation to obtain a county permit to assure compliance with county zoning ordinances. However, local zoning ordinances do not take precedence over the Federal government's jurisdiction over Federal lands, including jurisdiction over such Congressionally approved uses of Federal land as mineral activity. The Supreme Court upheld the decision of the Ninth Circuit Court of Appeals on a similar issue (Ventura County vs. Gulf Oil Corporation, et al. 1979). In that decision, it was determined that a company having statutory rights to engage in mineral activity on Federal lands cannot be required to obtain a permit from a county. This decision was based on the principle that the power over Federal land entrusted to Congress under the Property Clause is without limitation.

The Forest Service cannot delegate authority to the county to which it is not legally entitled. Since the county does not have the authority to restrict the scope of Congressional authority, the county has no jurisdiction over the current proposal. However, in response to concern for county participation, the Forest Supervisor invited San Luis Obispo County's participation as a cooperating agency. Monterey County and the Association of Monterey Bay Area Governments participated with particular interest in the issue of downstream groundwater and surface water effects.

2.3 PURPOSE AND NEED

The purpose of the exploration program is to meet two needs:

- Performance of annual assessment work on existing claims as required by the General Mining Law of 1872 and to file proof of the assessment work with the Bureau of Land Management

- Lomex Corporation needs to evaluate the mineral potential of their claims by developing information on the spatial extent, quality, and quantity of the minerals of interest.

The required annual assessment work can be achieved through mineral activities other than that which is currently proposed. However, data on mineral potential can only be developed through geotechnical drilling which provides a detailed three-dimensional physical sampling of the areas of interest.

2.4 GENERAL DESCRIPTION OF PROJECT AREA

San Luis Obispo County is situated along the central coast of California. Its county seat, the City of San Luis Obispo, is along U.S. Highway 101, nearly midway between San Diego and San Francisco. San Luis Obispo County is bounded by Monterey County on the north, Kern County on the east, and Santa Barbara County on the south.

The Navajo area is situated approximately 22 miles east northeast of San Luis Obispo. The project area encompasses approximately 385 acres (156 ha) within T. 29 S., R. 16 E., MDM, Sections 18, 28, and 29. The project area is wholly within the boundary of Los Padres National Forest. No private land is involved in the proposal except for access to the project areas.

The Santa Lucia Ranger District Multiple Use Plan (Los Padres National Forest 1979a) places no land use restrictions on the project area. The nearest special management area is the Beartrap Condor Habitat situated six miles southeast of the project area. The Multiple Use Plan permits a variety of simultaneous uses in the project area. These uses may include mineral activity, recreation, livestock grazing, and resource related activities. The Black Mountain RARE II area (Wilderness Further Planning Area) includes the north end of the project area (refer to Figure 4.0-11).

The project area is situated in the La Panza Range. The principal drainages are Navajo Creek and Camatta Creek, both tributaries of the Salinas River. The project area lies between approximately 1900 and 2100 ft. elevation. A mediterranean climate prevails with hot, dry summers and cool, moist winters. Precipitation is primarily in the form of rain. The wet season normally extends from November through March; rainfall ranges from 14 to 16 inches (36 to 40 cm).

2.5 MAJOR ISSUES

A number of major issues, concerns, and opportunities have been raised during the scoping process by private and public individuals, agencies, and organizations. Public participation was solicited through mailings, press releases, presentations requested by organizations and media, and at a public meeting held 26 August 1980 in Santa Margarita. Agency participation was elicited through mailings and at working sessions of the interdisciplinary team. A chronology of public involvement is contained in Appendix C of this document.

A summary of the written public response was used by the interdisciplinary team in the scoping process to identify the major issues, concerns, and opportunities. The summary is also included in Appendix C in order to further present the concerns, opinions, and attitudes of the people who responded to this proposal.

2.5.1 Issues and Concerns

The major issues and concerns listed below have been distilled from the material presented in Appendix C.

- What is the possibility for significant air pollution from dust, radionuclides, and radon gas?
- What water resource areas might be affected?
- Are water rights at issue?
- What are the potential environmental impacts on quality and quantity of ground and surface water resources from cuttings, vertical movement of water through drill holes, and sedimentation?
- Will the drill holes be sealed and capped?
- Will a reclamation program be undertaken to reclaim drillsites?
- Will a program be established to mitigate adverse effects of radioactive cuttings?
- What will be the extent of potential surface disturbance and erosion from pads, clearings, vegetation removal and crushing, and increased public access?
- What will be the effect on condor habitat?
- What will be the effect on livestock grazing?
- Are there possible significant effects on the food chain from uptake of radionuclides by plants?
- Is there potential for significant social or economic changes on local residents?
- Will practice of religion, accessibility to sites important to religious practice, and integrity of religious sites be impaired?
- Will regulated radioactive materials be transported from the project area?
- Will the proposed project have an adverse effect on the wilderness quality of the Black Mountain Wilderness Further Planning Area (RARE II)?
- What will the visual impacts be?
- Will cultural and historic resources be protected?
- Will the project cause significant noise levels?
- Will the project increase the fire danger in the area?
- Will a program be established to monitor water quality and compliance with other management requirements and constraints imposed on the project?
- Will the Lomex Corporation have legal and financial responsibilities for significant problems resulting from the exploration?
- Will the project adversely affect plants and animals including threatened and endangered species?

2.5.2 Opportunities

- Clearings will temporarily open up chaparral, increasing edge for wildlife and access for hikers and hunters.
- Development of baseline information will be developed on local and downstream surface and ground water supplies and quality; this is of value for public health and environmental protection.
- Information will be developed on potential mineral resources.

3.0 ALTERNATIVES

3.1 INTRODUCTION

The range of alternatives developed for this environmental analysis has been developed primarily on the basis of the following considerations: applicable law and regulation, practical and feasible operations, pertinent environmental facts and scientific data, and the data, authority, and responsibility of the Forest Service, U.S. Department of Agriculture.

The objectives of this section of the environmental impact statement are:

- Documentation of the planning process used to formulate reasonable alternatives
- Documentation of the reasoning used for eliminating alternatives from detailed consideration because of technical or administrative restraints
- Description of reasonable alternatives available for selection by the decision-maker
- Based on anticipated effects of the project on the environment and on resource uses, incorporation of management constraints and guidelines and corresponding mitigation measures which would result in minimal effects on resources
- Development of a monitoring program to provide feedback on the implementation of the management constraints and guidelines.

The proposed exploration program has as its major purpose the development of the extent and potential value of mineralized zones.

If the Lomex Corporation or other mineral firm develops plans for further exploration or for development and/or production of mineral reserves, additional environmental analysis will be undertaken by the Forest Service and other responsible agencies.

3.2 FORMULATION OF ALTERNATIVES

Development of alternatives is a step-wise procedure. The steps taken for this environmental analysis included (1) development of a preliminary list of alternatives based on administrative and operational considerations; (2) expansion of this list to consider public issues and management concerns; (3) elimination of certain unimportant alternatives from detailed study; and (4) further development and refinement of certain alternatives by incorporating constraints, mitigation, and/or monitoring derived from the technical environmental studies.

Alternatives considered but eliminated from further study are the transportation alternatives and an alternative developed to provide geological data solely from remote sensing and other surface assessment methods ("surface geophysicial assessment"). All transportation alternatives were dropped from further consideration when the Lomex Corporation eliminated the proposed road from the Plan of Operation (Refer to Section 2.2). Transportation alternatives that had been considered were:

- Fernandez Road North
- Fernandez Road South
- Road across the Black Mountain Further Planning Area
- Helicopter Access
- Proposed Road.

Elimination of an access route from the Plan of Operations reduced the project's potential for environmental impact. The surface geophysical assessment was eliminated from detailed study because it would not provide the requisite geological and mineralogical information and was not a reasonable alternative.

3.3 DESCRIPTION OF PROJECT ALTERNATIVES

This section of Chapter 3 describes the project alternatives in detail. The estimated effects of each alternative on the environment will be discussed in Chapter 5. The alternatives are:

- Alternative One: No Action, Forest Service Takes No Action on Plan of Operations
- Alternative Two: Recommend Emergency Withdrawal of Subject Land from Mineral Entry
- Alternative Three: Approval of Lomex Corporation's Proposed Plan of Operation
- Alternative Four: Approval of Modified Plan of Operation (Forest Service Preferred Alternative)
- Alternative Five: Approval of Modified Operating Plan with Additional Geophysical Study

3.3.1 ALTERNATIVE ONE: No Action, Forest Service Takes No Action on Plan of Operations

The objective of Alternative One is to describe the results of choosing "No Action." "No Action" would provide a benchmark against which the effects of the other alternatives can be compared.

Regulatiions applying to operations conducted under the mining laws as they affect surface resources on all National Forest Lands (36 CFR 252) provide the authority for approving reasonable regulation of mineral activities associated with locatable minerals on public domain land to safeguard environmental values. These regulations permit the Forest Service to:

- determine whether an operating plan is required
- approve plans of operation
- require changes in plans of operation
- provide appropriate review, including environmental analysis, if necessary, of plans of operation
- approve portions of operating plans, if necessary.

No legal authority is conferred on the Forest Service to deny or disapprove plans of operation. Should the Forest Service fail to approve a plan of operation submitted in accordance with applicable law and regulation, a claimant has the statutory right (General Mining Law of 1872) to proceed with the proposed action.

Thus in the present case, "No Action" on the part of the Forest Service would in all likelihood result in the realizaton of the Lomex Corporation's proceeding with the mineral activities covered in the Plan of Operations. The "No Action" alternative would allow the Lomex Corporation to explore the claims without the proper environmental analysis and regulation.

3.3.2 ALTERNATIVE TWO: Recommend Emergency Withdrawal of Subject Land from Mineral Entry

The objective of this alternative is to respond to public input requesting consideration of withdrawal in this environmental impact statement. "Subject land" is defined as that land encompassing mineral claims held by the Lomex Corporation (Figure 3.0-1).

Legal authority is provided for emergency withdrawal under Section 204(e) of the Federal Land Policy and Management Act of 1976 (FLPMA). Withdrawal made under this authority would provide for withholding withdrawn land from settlement, sale, location, or entry under some or all of the general land laws, including the General Mining Law of 1872, for the purpose of limiting activities under those laws in order to maintain other public values for a particular public purpose or program.

If the Secretary of the Interior determines, or when the Committee on Interior and Insular Affairs of the House of Representatives or the Senate notifies the Secretary that an emergency situation exists requiring extraordinary protective action, the Secretary can make an emergency withdrawal for up to three years. An emergency withdrawal made in this manner would be reviewed during the withdrawal period to determine whether an extension is appropriate. The Forest Service, basing its action on empirical findings of this environmental analysis, may or may not recommend that the Secretary of the Interior determine that emergency withdrawal of the subject lands is necessary to preserve values that would otherwise be lost.

Emergency withdrawal would prevent new claims from being located (established) and would prevent claims previously located from being validated by a later mineral discovery. However, such withdrawal would not prevent mineral operations from taking place on valid existing claims, including those operations intended to provide data on mineralization.

Since the claims of the Lomex Corporation on the subject land would predate emergency withdrawal, their legal status would be subject to a validity determination based on a discovery on or before the date of withdrawal. If the validity of the claims is confirmed through the mineral examination process, the Lomex Corporation could proceed with mineral activity unless condemnation proceedings were initiated.

The outcome of a Forest Service recommendation for withdrawal would depend on events beyond its jurisdiction and control. For the purpose of assessing effects of the withdrawal alternative in this environmental impact statement, it is assumed that the emergency withdrawal would be followed by condemnation and exploration would cease.

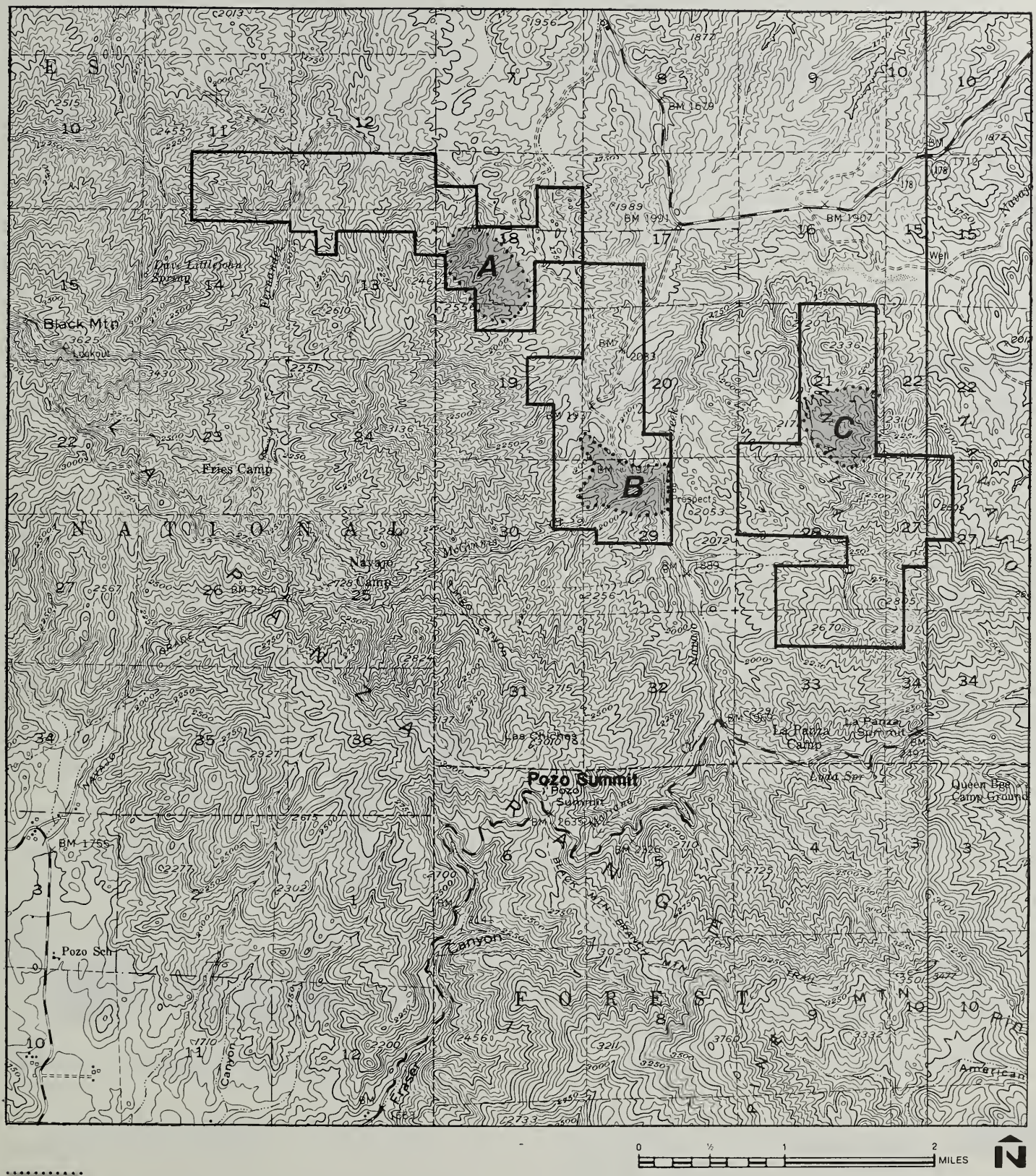
3.3.3 ALTERNATIVE THREE: Approval of the Lomex Corporation's Proposed Plan of Operations

The objective of this alternative is to respond to the Lomex Corporation's request for approval of their proposed plan of operation. The major elements of the proposal are:

- siting and engineering of geotechnical drill holes
- facilities, equipment, and personnel
- duration and schedule of operations
- drilling and sampling procedures
- transportation.

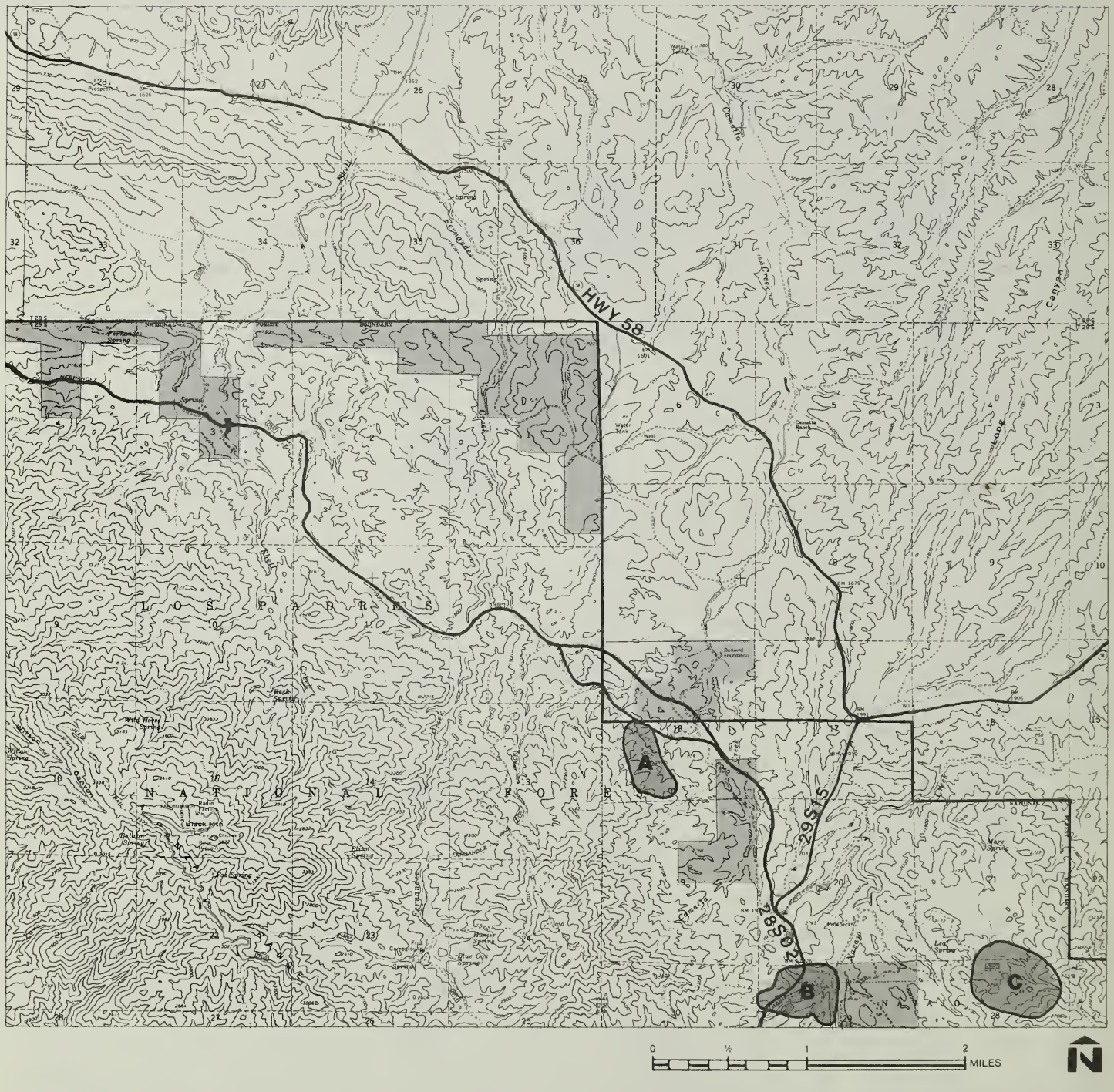
These project elements are detailed in Appendix A and are briefly described below.

The Lomex Corporation has proposed to pneumatically drill a maximum of 145 cased geotechnical drill holes, approximately 2.5 to 3 inches (6.2 - 7.6 cm) in diameter to a maximum depth of 250 ft (76 m). Since the findings of holes drilled early in the program determine the number of additional holes required, fewer holes may be drilled than called for in the maximum program. Three separate localities



Exploration Area

Figure 3.0-1 Approximate Area Under Lomex Corporation Mining Claim



Private Property

Approximate Boundary of Exploration Areas

Figure 3.0-2 Project Vicinity

comprise the "project area" (Figure 3.0-2). These localities are termed "Exploration Areas."

Exploration Area A is the northernmost of the three areas and is situated in an area of considerable previous mineral exploration. Exploration Area B is situated near the confluence of McGinnes Creek and Navajo Creek and is also an area of previous mineral activity, dating to the late nineteenth century. Exploration Area C is the easternmost portion of the project area. A high voltage transmission line crosses the area. It is also an area of previous mineral activity, especially gold claims established during the late nineteenth century.

Facilities and equipment include vehicles, power source, drilling, and other equipment for a crew of approximately four people.

The proposed program would take place during approximately one summer month of each of three consecutive years. Drilling operations and other activities would be underway twelve hours a day, six days a week. The schedule of operations would depend primarily on the approval date of the Plan of Operation.

Drilling would be done by a track-mounted pneumatic, downhole air hammer. Dust would be controlled by entraining water and detergent into the downhole air stream and by a horizontal baffle situated above the drill hole. Samples will be collected from the cuttings at penetration intervals of 10 ft (3 m).

Transportation will be required for personnel and samples. Eight round trips are expected each working day in the worst case and fuel or water tankers would occasionally be required. The drill rig is self-propelled and would move once or twice each day to new drilling sites. There would be no new permanent or temporary road construction.

3.3.4 ALTERNATIVE FOUR: Approval of Modified Operating Plan, the Forest Service Preferred Alternative

This alternative has been developed to accomplish three objectives:

- to provide information required by the proponent
- to provide information on the ground water basin
- to incorporate mitigation measures into a minimum impact design.

The information required by the proponent will be obtained through core drilling as proposed in the Plan of Operations (Alternative Three). However, under Alternative Four mitigation measures (refer to Appendix D) will be placed on the proposed action. A program of ground water study will develop baseline information for the proposed project (including offsite ground water effects) and potential future mineral development. Incorporating the mitigation measures and the water basin study into the proposed Plan of Operations would result in a mineral exploration program of minimum impact.

Alternative Four would be similar to Alternative Three in these areas: drill hole siting, sampling procedures, facilities and personnel, and schedule of operations. Alternative Four provides for changes in drill hole engineering, and adds cuttings management, management of off-site noise exposure, cultural resource management, erosion control, visual resource management, the duration of operations, and a water quality study. These changes are briefly discussed below and are detailed in Appendix D.

- Vegetation will be cleared from an area 10 ft in diameter centered on the drill hole (3m) as a fire prevention measure
- Drill holes, with potential for contamination resulting from interaquifer exchange, will be either destroyed or properly sealed from zones of deleterious water within one week of drilling
- All drill holes which are not to be immediately abandoned will be constructed with a sanitary seal and will be capped in order to prevent unauthorized access
- All drill holes will be properly abandoned
- Drilling hours will be restricted in Exploration Area B
- Clearings and pads will be constructed and operations will be undertaken according to specifications developed to protect visual quality
- Archeological and historical sites and sites of value to religious practice will be protected through a program of avoidance
- Operations will be conducted according to "Best Management Practices" and the erosion control policies of the Regional Water Quality Control Board in order to reduce erosion and siltation (refer to Appendix G).

3.3.5 ALTERNATIVE FIVE: Approval of Modified Operating Plan with Additional Geophysical Study

The objective of this alternative is to provide for the acquisition of additional information on surface and ground water prior to developing final mitigation measures for the proposed Plan of Operation.

This alternative provides for approximately one additional year of delay for acquisition of information beyond that acquired for this environmental impact statement.

The research program would focus on Exploration Areas A, B, and C. The program of research would have the following objectives:

- a description of the geologic setting of the ground water in the project area, including rock types, their spatial configurations and distributions, their physical and chemical characteristics, and faulting and shearing
- a description of the spatial extent and capacity of the aquifer(s) in the research area
- a description of mineralization within the research area, including distribution of uranium in ground water.

The information would be developed through the following research methods and techniques:

- further surface geological reconnaissance
- further surface and ground water quality study
- further surface geophysical assessment
- subsurface geophysical and hydrogeological assessment through core drilling or other exploratory drilling.

In overview, the study would conform to the following:

- The geological reconnaissance and water quality study would be expansion of the studies undertaken for this environmental impact statement
- Surface geophysical assessment would provide further basis for geological inference concerning hypothetical extent and character of areas of mineral interest
- Subsurface geophysical and geohydrological assessment would provide confirming evidence of the nature and extent of mineralization and the nature and extent of the ground water basin. The principal method of subsurface investigation would be exploratory drilling.

Approximately 30 drill holes, ten in each Exploration Area, would be required. The drill sites would be selected on the basis of study considerations. These drill holes would be constructed and abandoned according to specifications and methods described for Alternative Four, except where these specifications would interfere with study objectives. The balance of the program of mitigation and avoidance developed for Alternative Four would apply also. Any effects of the geotechnical drilling program would be in addition to the effects of the modified Plan of Operations.

4.0 AFFECTED ENVIRONMENT

4.1 INTRODUCTION

In the summer of 1980, the Forest Service and certain cooperating agencies began environmental baseline studies. These studies were done in the project area and on adjacent Federal and private land which may be affected by the proposed project. An interdisciplinary team was formed with expertise in the fields of land use and recreation, cultural resources and the social environment, biology, ground and surface water, soils, geology and minerals, mineral operations, and visual resources. Other expertise was made available in the areas of natural radiation, radiation exposure, economics, and noise. This team developed new information and utilized existing data to described the affected environment.

The results of the literature surveys, field data collection and data reduction and analyses have been assembled in technical information files. In the following section the significant features of the environment which might be affected by the proposed project are briefly described using text, figures, and tables.

The affected environment is described as follows:

- Air Quality
- Water Resources
- Recreation
- RARE II
- Visual Environment
- Noise
- Natural Radiation
- Social and Economic Environment
- Geology and Minerals
- Soils
- Vegetation
- Wildlife
- Archeological and Historical Values

4.2 AIR QUALITY

The project area is in the South Central Air Basin as described by the State of California Air Resources Board. The San Luis Obispo County Air Pollution Control Board has designated the upper Salinas Valley as a "non-attainment" area (i.e., does not meet Federal or State Ambient Air Quality Standards) for Total Suspended Particulates (T.S.P.).

No long term air quality data have been gathered either for T.S.P. (total volume) or differentiated T.S.P. with radioactive sampling and identification. Short term sampling was done at Black Mountain during March 1981 to measure background levels of gamma emitters in airborne particulate matter (U.S. Environmental Protection Agency 1981). According to the Environmental Protection Agency (1981), these data (Table 4.0-1) are within typical natural background radiation levels in the United States.

TABLE 4.0-1

Gamma Emitters in Suspended Particulates

Radionuclide	Concentration $fCi/m^3 \pm$ S.D.(2)[a]
Uranium-238	0.17 ± 0.07
Uranium-234	0.16 ± 0.08
Thorium-232	0.16 ± 0.06
Thorium-230	0.23 ± 0.08
Polonium-210	2.3 ± 0.3

[a] Femtocuries (10^{-15} Curies) per cubic meter plus or minus twice the standard deviation

Sampling of ambient radon concentration was done at the proposed exploration sites. These data (Table 4.0-2) indicate levels within established natural background activity.

TABLE 4.0-2

Radon Activity Levels

Sample Location	Concentration $pCi/l \pm$ S.D.(2)[a]
Prospecting Area A	0.35 ± 0.06
Prospecting Area A	0.14 ± 0.04
Prospecting Area B	0.30 ± 0.06
Prospecting Area B	0.16 ± 0.04
Prospecting Area C	0.09 ± 0.03
Prospecting Area C	0.08 ± 0.03

[a] Picocuries per liter plus or minus twice the standard deviation.

4.3 WATER RESOURCES

4.3.1 Ground Water

The information for this section is based on surface and ground water quality assessment; published and unpublished documents; and subsurface geological, mineralogical, and geohydrological data from Exploration Area B.

Both the alluvium along the main streams and the bedrock in the proposed project area contain groundwater. The material in these two zones is permeable and is readily recharged by rainfall and surface water. Because the alluvial deposits are thin and of limited extent, they do not contain water in a quantity that serves as a dependable water supply. They are not used as a source of ground water in the project area.

The bedrock units--virtually all granite and metamorphic rock (refer to Section 4.4)--are pervasively fractured and transmit ground water in a quantity that in some areas will sustain small domestic water supplies. Generally, the granitic rocks have the lowest permeability and transmission rates. Wells and test holes which penetrate these materials encounter water only within the upper weathered zone (0 - 50 ft) and within narrow zones of shearing. Domestic wells 29G1, 29A1 and Drill Holes 16-77, 2-71, 3-71 (Figure 4.0-1) penetrate unsheared granite, and are essentially dry holes in terms of domestic well water producing capability (Table F.1, Appendix F). Wells drilled to a depth of 200 feet or more in this rock commonly yield from one half to two gallons per minute (gpm). However, many such wells are dry or do not yield enough water to warrant development. Actual test data obtained by the Lomex Corporation in Area B from one of the most productive drill holes indicates a specific capacity of about 0.01 gpm per foot of drawdown. This means that at a pumping rate of 1 gpm from this well, the drawdown would be 100 feet.

Pump testing indicates that Drill Hole 1-75 (Figure 4.0-1) could produce up to an estimated 3,000 gallons per day or 2 gpm for domestic purposes.

The occurrence of ground water in the general area is controlled primarily by permeability and structure within the various rock types. Ground water occurs unconfined with fair to negligible hydraulic continuity between the various formational units.

The ground water in the bedrock units occurs in a generally interconnected system of joints and fractures. Under these conditions, there is a remote chance that an artesian condition could exist. However since the joints and fractures become tighter and disjunctive with increasing depth, artesian conditions are unlikely. No perched watertable or artesian conditions are known to exist in the vicinity nor do geological conditions favor the development of a perched water table. As in most crystalline rock terrain, fractures tend to be more prevalent and open near the surface. Thus the yield of ground water to wells generally decreases with depth. Figure 4.0-2 generally illustrates this principle.

The extensive and pervasive fracture system has direct implications for the movement of dissolved uranium in groundwater. Movement of infiltrated precipitation through the zone of weathered rock results in the natural and continuing destruction of near-surface uranium ore bodies. Uranium is made soluble by oxygenated water and is mobilized downgradient into regional ground water and surface water systems. Dilution by water percolated through unmineralized rock rapidly reduces concentration of dissolved uranium downgradient of the ore zone.

Typically, wells in the granite, particularly those situated at higher elevations, have low water levels during dry years and levels approaching the ground surface during wet years. The well bores act as partially sealed tubes to intercept shallow ground water moving through the upper weathered zone during periods of heavy precipitation. In some cases, as at Well 29G1 and Drill Hole 3-71, water levels rose more than 100 feet during the four-month heavy precipitation period, January through April 1978. Conversely, where wells intercept zones of shearing through the granite, the permeability is higher and the seasonal water level range is much lower. Drill Hole 1-75 and Well 29H2 are typical with seasonal water levels varying less than fifteen feet.

The metasedimentary materials, including the section containing the ore body, tend to have a much higher permeability than the granite. This results in a greater uniformity of water levels in drill holes regardless of topographic position. As shown in Figure 4.0-1, water levels under the ridges at the end of the 1977 to 1978 precipitation period were only slightly higher (5 - 20 ft) than levels in either metamorphic or alluvial deposits flooring the McGinnis and Navajo Creek floodplains. Permeability data acquired by Lomex Corporation suggest an average of about 0.5 gallons per day per square foot (gpd/sq ft) for metasediments underlying the McGinnis Creek floodplain (Lomex Corporation 1978). Lomex data indicate permeability range up to five gpd/sq ft for portions of the metasedimentary section including the ore zone under the ridge south of McGinnis Creek (Lomex Corporation 1978).

Permeability within the metasediments appears to be controlled largely by stratigraphic type although added permeability results from rock shearing. Drill Holes 3-75 and 10-77 intersected zones of vertical shearing and on test yielded more than ten gpm. The permeability of material in these holes may exceed ten gpd/sq ft (Lomex Corporation 1978) because of the pervasive fracturing in the project area. The ground water occurs under water table, or unconfined, conditions. The water table, in general, conforms to the topography; that is, the groundwater occurs at a higher altitude under the ridges than under the valleys. On a regional scale, the Salinas River is the ultimate sink for ground water discharge. Ground water contours (Figure 4.0-1) are typical of water-table contours in an area of considerable relief. The contours indicate that the source of recharge is local precipitation and that the general direction of ground water movement is from upland areas toward and along the stream courses. During the rainy season local streams may receive a small percentage of their flow from the ground water system. However, during the dry season most of the ground water reaching the stream courses is consumed by evapotranspiration or phreatophyte demand in the floodplain area.

A slope-area analysis done by Lomex Corporation illustrates the very small quantity of ground water moving from the mineralized area into McGinnis Creek and Navajo Creek floodplains. Using the observed maximum permeability of five gpd/sq ft and an average flow section of 50 feet with maximum wet season gradients as illustrated by Figure 4.0-1, ground water moving through the Navajo mineralized zone would approach a maximum of 100,000 gallons per day or approximately seven gallons per minute. On an annual basis the average daily flow rate is much less, averaging under 3,000 gallons per day because of declining gradients during the dry season.

Analysis of the water level contours (Figure 4.0-1) indicates ground water in the upland areas, regardless of rock type is recharged primarily by percolation from direct precipitation. Navajo and McGinnis Creeks are influent streams, that is, receiving from rather than contributing to the recharge of the ground water reservoir.

Seasonal water level fluctuations are greatest in areas of minimum rock permeability and can range to 100 feet or more where the material is unweathered granite with a low coefficient of storage. In areas of metamorphic rock occurrence, drill hole observations since 1971 indicate water level fluctuations are generally less than 15 feet. Here the storage coefficient is probably much higher and in selected stratigraphic materials may approach that of unconsolidated sandy sediments.

Similar conditions of ground water occurrence and movement probably occur in Areas A and C where the same geological units, similar weathering, similar fracturing, and precipitation patterns prevail.

Springs occur where water filled fractures intersect the land surface. Where the fracture systems are fairly large and contain enough water in storage, the spring discharge may be perennial. However, where the interconnected fracture system is small, the spring may flow only during the rainy season and may become a seep during the dry season.

4.3.2 Surface Water

The project area is drained by three creeks. Area A is drained by a first-order tributary of Camatta Creek. Area B is drained by third-order McGinnis Creek and fourth-order Navajo Creek. McGinnis Creek joins Navajo Creek at a point adjacent to Area B. Area C is drained by a first-order tributary of Navajo Creek which joins San Juan Creek approximately ten miles north of the La Panza Ranch. Camatta Creek joins the San Juan Creek near Shandon, California. San Juan Creek joins the Estrella River at Shandon. The Estrella River joins the Salinas River at San Miguel, California (Figure 4.0-3). The watersheds of these creeks are mountainous with slopes often reaching 30-60%. Elevations within the basins of Camatta Creek range from 2500 feet at the top of the ridge near Area A to 1600 feet at the Camatta Ranch where Camatta Creek becomes a third-order stream. McGinnis Creek watershed elevations range from 3100 feet at the watershed boundary with the Pozo Creek watershed to 1900 feet at the confluence of McGinnis and Navajo Creeks. Navajo Creek elevation at the watershed boundary with Pozo Creek watershed is 3700 feet and 1900 feet at its confluence with McGinnis Creek near Area B. The highest elevation within the watershed that drains Area C is 2700 feet. The elevation is 700 feet where the first-order tributary joins Navajo Creek half a mile northwest of Mare Spring. The average slope of the creeks and streams that drain Areas A, B, and C is 20%, 4%, and 7% respectively. The area of the watershed that drains Area A and C is 0.3 and 0.8 square miles, respectively. Area B is drained by McGinnis and Navajo Creeks that have areas of 3.1 and 7.3 square miles, respectively, at their confluence. These watersheds are shown in Figure 4.0-3.

Approximately 0.75 miles downstream from Area A the first-order tributary to Camatta Creek, is obstructed by a 10 foot high earth dam which creates a small impoundment approximately one acre in surface area. This reservoir has been used to store water for livestock and for crop irrigation.

Permanent gauging stations near the project area are lacking on all three of the creeks draining the area. Temporary gauging stations have not been established on the project area. However, stream discharge measurements by USGS in Area B were taken when water quality work was being done on Navajo Creek (sample #9) and at the confluence of Navajo and McGinnis Creeks (sample #5)(refer to Figures 4.0-4 and Appendix D.8.1). The flow rate for Mare Spring (Area C) was also determined.

Streams that are analogous to the streams in the project area were used to determine approximate runoff values. Runoff from such similar streams is approximately 85 acre-feet per square mile or 0.13 acre-feet/acre. Based on this figure, annual flows from watersheds encompassing Areas A, B, and C are 28 acre-feet, 861 acre-feet, and 65 acre-feet, respectively.

The stream draining Area A generally flows intermittently from December through March. Navajo and McGinnis Creeks drain a significantly larger watershed than does the stream in Area A. These two streams flow from approximately December through July. The streams usually flow continuously once a significant storm event occurs which is usually in December or January.

The water from the three creeks recharges ground water downstream. It is used primarily for agriculture along the Salinas River with some water used for industrial and domestic purposes. Water quality samples have been taken since the summer of 1979 and are summarized in Tables F.2 and F.3 (Appendix F).

All water rights in the State (both Federal and private lands) are governed by regulations

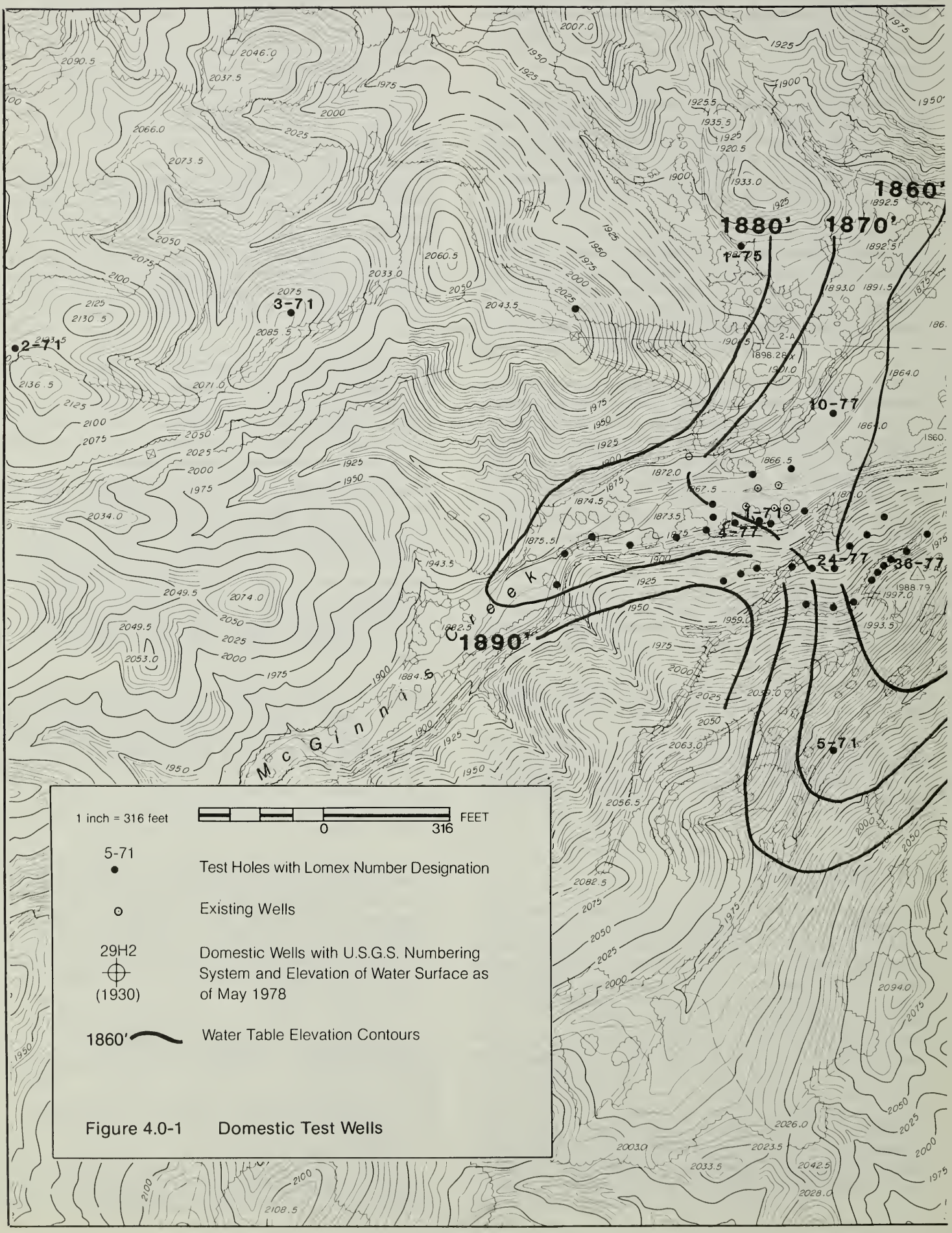
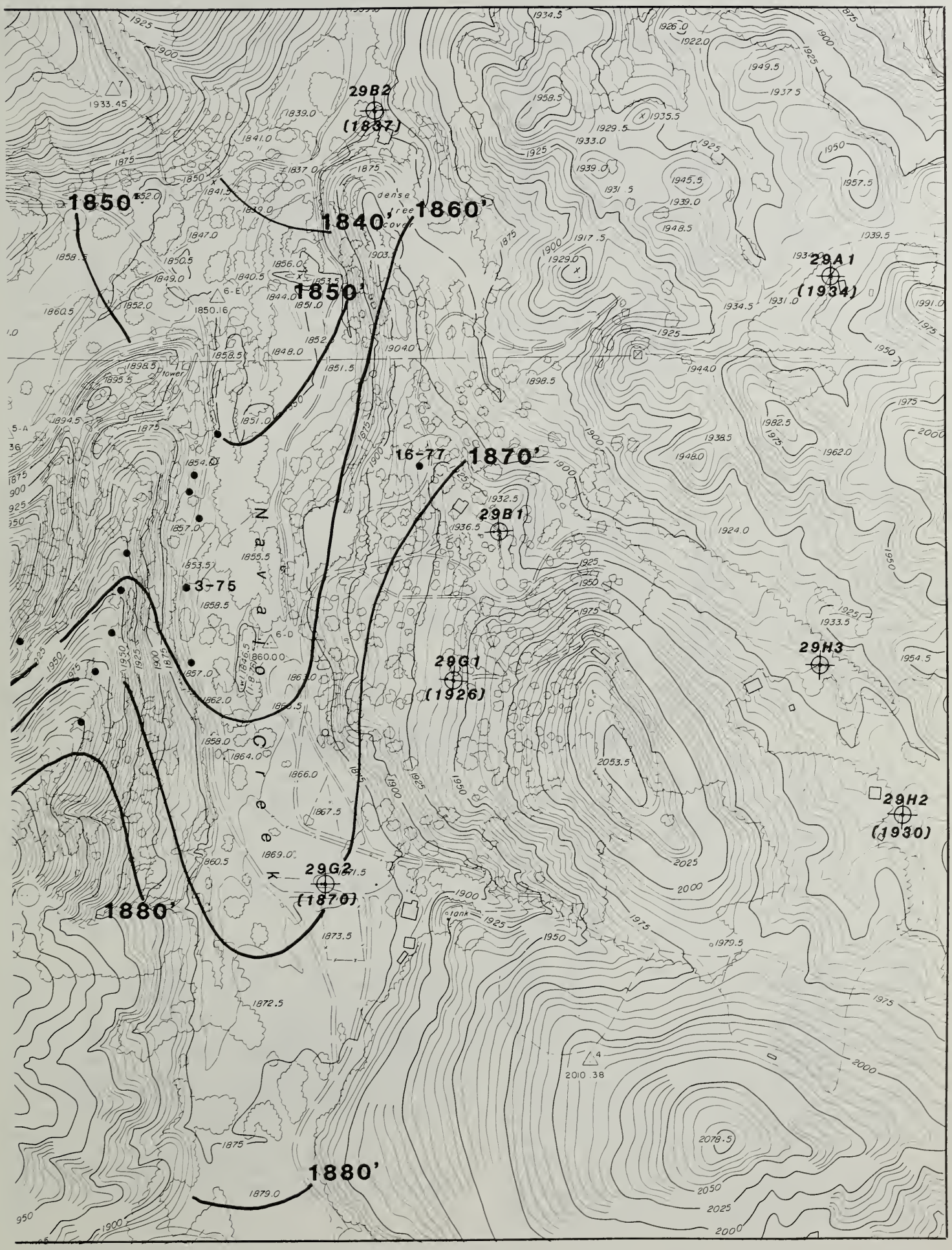


Figure 4.0-1 Domestic Test Wells


29B2
(1837)
1850'
1840'
1860'
1850'
29A1
(1934)
16-77
1870'
29B1
3-75
Navajo Creek
29G1
(1926)
29H3
29H2
(1930)
29G2
(1870)
1880'
1880'

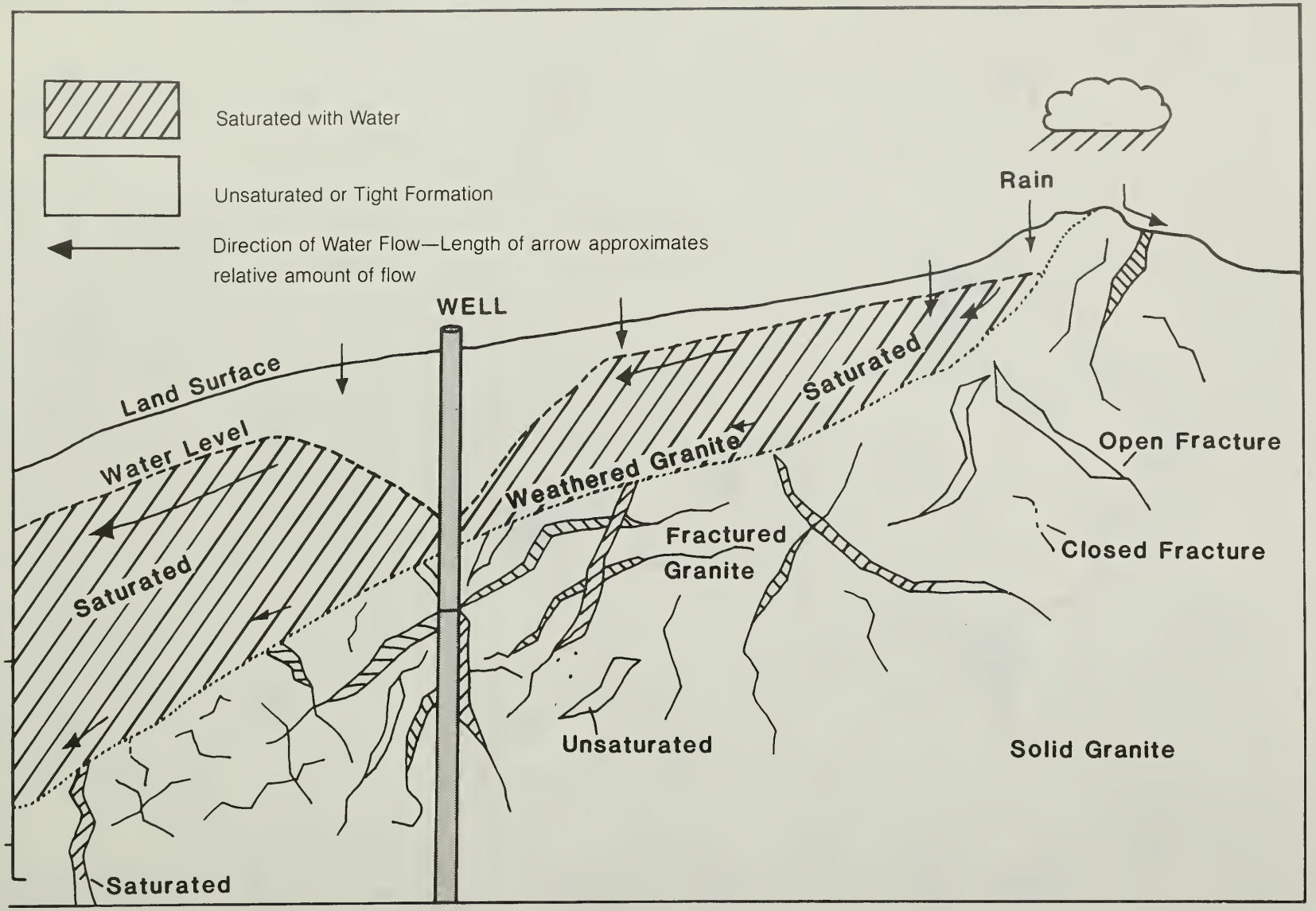


Figure 4.0-2 Representative Cross-section of Well and Water Table in Fractured Granitic Rock

established by the California State Water Resources Control Board, Division of Water Rights. These rights allow the landowner or one who applies for the right to use surface and subsurface water either by riparian right, appropriative right, reserve right, or by appropriation of underground water.

4.3.3 Water Quality

Lomex has previously sampled and analyzed the heavy metal content of a number of drill holes, wells and surface water sources in the general area. The sampling, conducted in May, 1978, followed a near record four-month period of precipitation and ground water recharge. As a consequence, all samples are relatively diluted by quantities of surface and ground water recharge and are expected to represent the lowest ionic concentrations obtainable. Laboratory results are summarized in Table F.4 (Appendix F). Sample locations are as shown on Figure 4.0-1. The highest ionic concentrations were found in Drill Hole 24-77 centrally situated within the Navajo mineralized zone. Ground water at this location contains, in terms of current Federal drinking water standards, excessive quantities of barium (10X), chromium (2.5X), lead (1.6X), manganese (28X), selenium (2.5X), and radium-226 (2.8X). Drill Hole 4-77, situated on the west edge of the mineralized zone, yields water with excessive manganese (2.4X) and selenium (2X) while radium-226 approaches but does not exceed the Federal limits. At other sampling points, both ground and surface waters meet or exceed Federal drinking water standards for the tested components.

Very generally, it is concluded from the data acquired that the poorer quality ground water is restricted to the immediate area of the Navajo mineralized zone. There is no evidence to indicate migration of this ground water into areas of current domestic water use.

Water quality samples have been taken in and adjacent to the project site from July 1979 to September 1981. There were eleven sampling stations established for this EIS (see Appendix D,). The Geological Survey (USGS), Water Resource Division, in cooperation with Los Padres National Forest, was responsible for collection, analysis, and interpretation of the data.

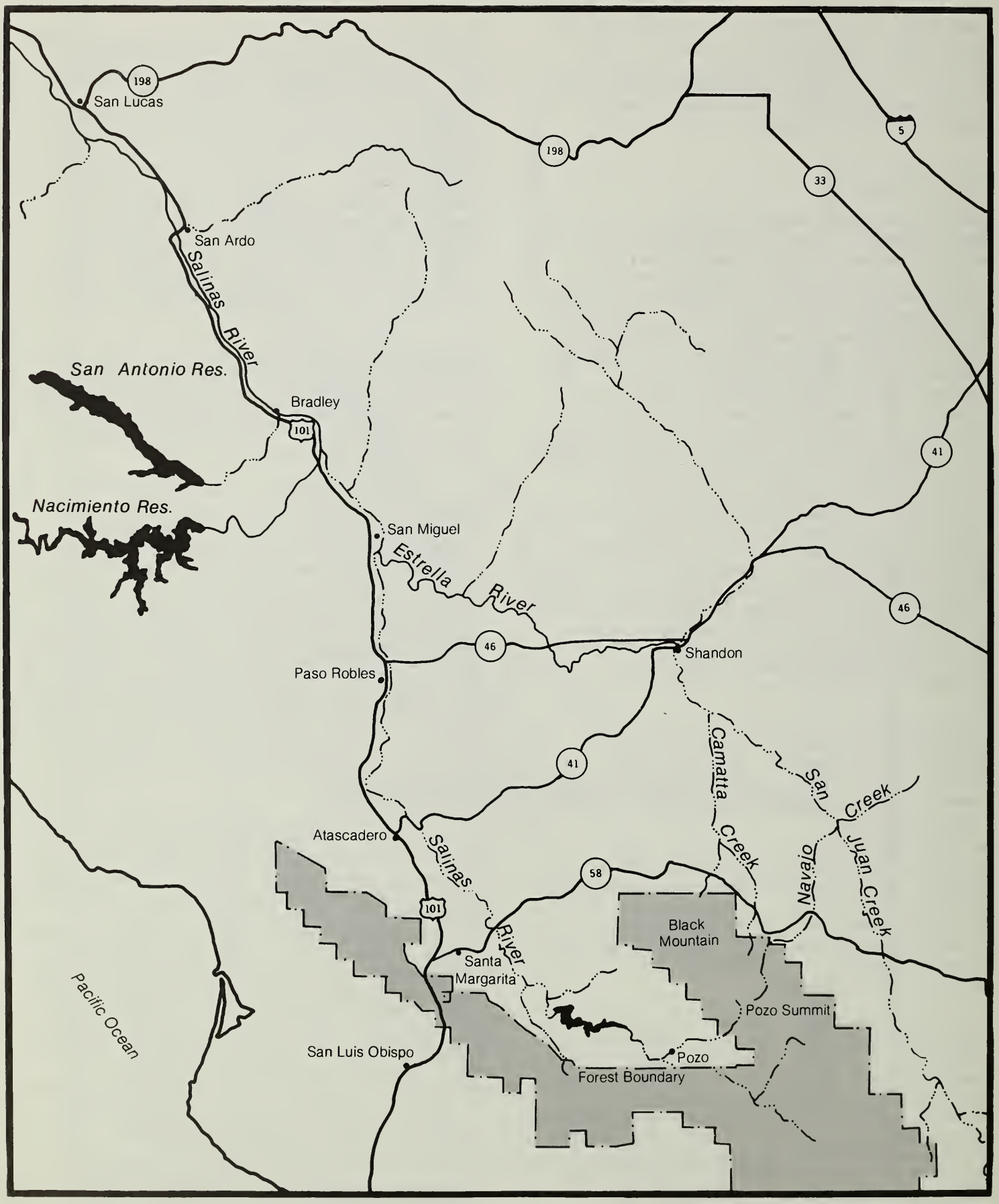
Water quality analysis of samples taken 19 July 1979, at Anderson's Well and Navajo Creek below the confluence with McGinnis Creek, were semi-quantitative only (Appendix F, Table F.3). The July 1979 analysis was only a scan of the water quality parameters and is not nearly as accurate or precise as the June 1980 thru September 1981. The 1980-1981 samples were analyzed by standard methods and procedures that meet Environmental Protection Agency (EPA) and/or USGS analysis requirements. This semiquantitative analysis should be used with caution when comparing with water quality data from samples collected from June 1980 to Sept. 1981 by the USGS.

The State of California, Department of Public Health - Radiation Section, in August 1980 and February 1981 conducted a radiological analysis on the Red Wind Foundation main well. LFE Laboratories in Richmond, California, has also done an analysis on the Red Wind main well. The analysis results are shown in Appendix F, Table F.4. The results of the three analyses are included for information only and are not summarized. Information such as sampling technique, preservation and transportation of sample, laboratory procedures and quality control measures used for the analyses is not completely known. From the information that is known, however, it appears that the procedures, techniques, etc., used by the State of California are very similar to the ones used by the USGS.

The following is an interpretation by the USGS of the USGS and Forest Service water quality program of June 1980 to Sept. 1981, which includes the water type at each sampling site, comparison of water quality among sampling sites, source of ground water, and suitability as drinking water.

This information is shown in Tables F.6 and F.7, Appendix F. Most waters have a mixed water type. Bicarbonate is the principal anion and usually constitutes more than 50 percent of the anions present. Sulfate dominates in drill holes 5-71 and 24-77, but bicarbonate dominates in drill hole 36-77. No anion dominates in Pierce's well, but bicarbonate and sulfate together compose about 80 percent of the anions present. The principal cation varies from site to site and only at two sites is there a cation that composes more than 50 percent of the cations present (calcium at drill hole 5-71 and sodium at the Red Wind main well). Calcium or magnesium are the principal cations at sites with a mixed water type except for Pierce's well where sodium predominates.

There is a wide range in dissolved-solids concentrations with drill hole 5-71 having the highest concentrations and Navajo Creek below Exploratory Area B having the least. Based on water type and dissolved solids concentrations, surface-water sites (Navajo Creek above and below Exploratory Area B and Red Wind's big pond) are very similar in water quality. Anderson's well is in metasediments and the Navajo Creek stockpond well is in alluvium, according to the owner (Robert Lewis. 1980. Personal communication). Well logs are not available for either of these wells. On the Lomex Corporation's geologic map, Anderson's well appears to be in alluvium, but because this well is perforated between 40 and 50 feet below the surface, it actually is producing from metasediments which underlie the shallow (perhaps 10 to 15 feet thick) alluvial deposits. Except for greater dissolved-solids concentrations, these wells have water quality similar to that of surface-water sites. These wells are located in terrace areas adjacent to Navajo Creek. The water type of Pierce's well and Red Wind's main well are similar, but Pierce's well has a much greater concentration of dissolved solids. Pierce's well probably taps



4.0-3 Streams Location Map

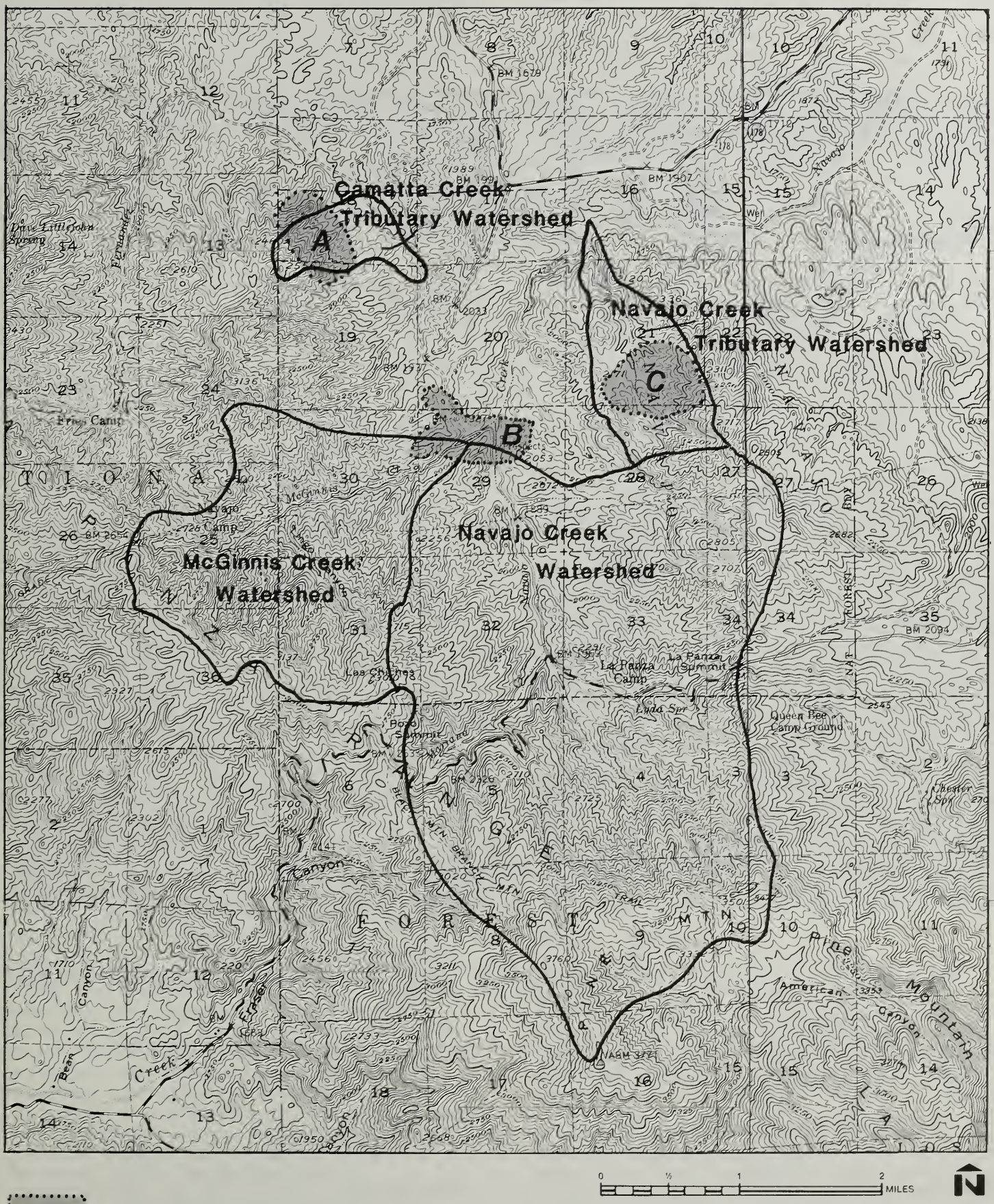
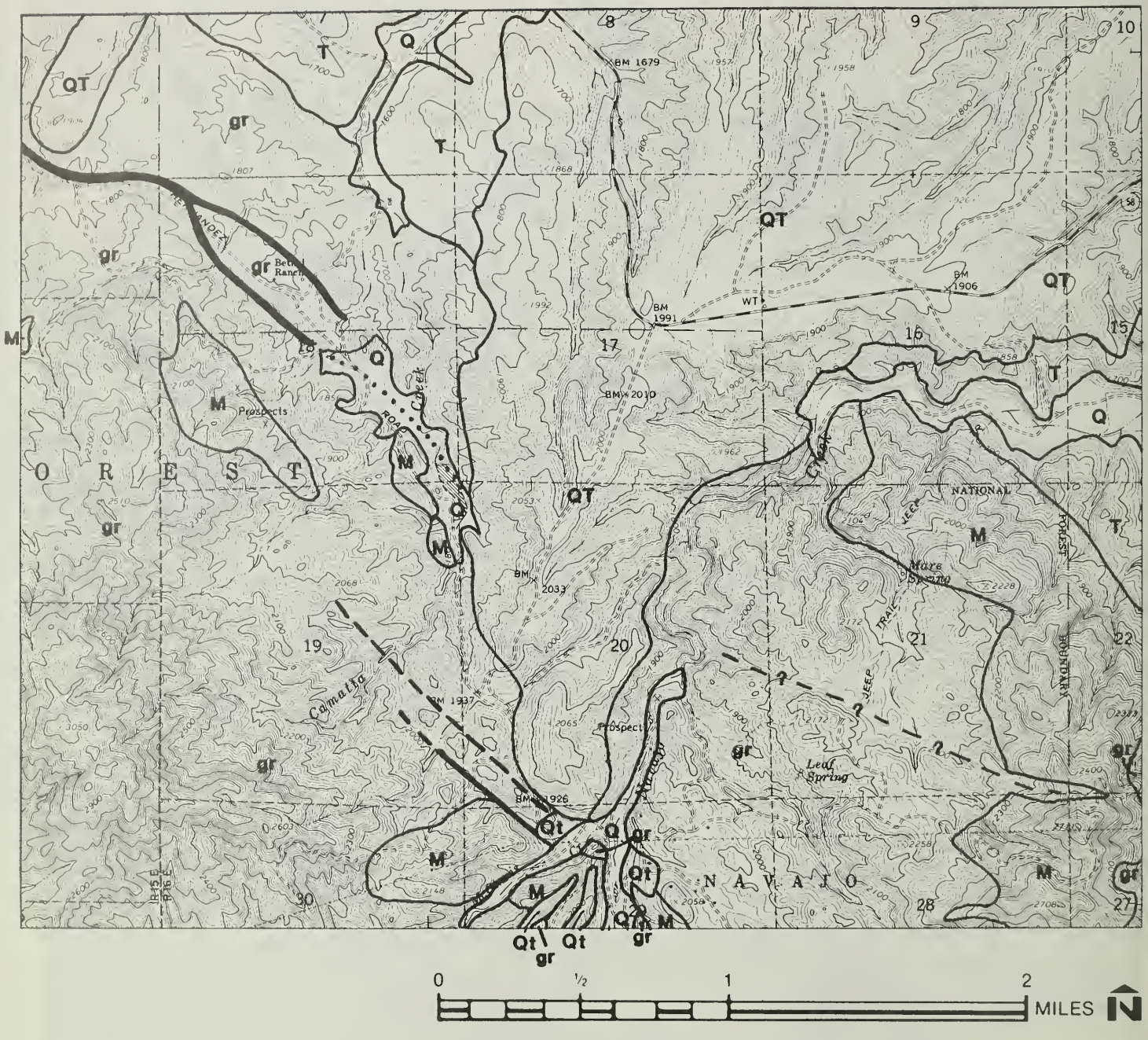


Figure 4.0-4 Watersheds Map



Q	Quaternary alluvium
QT	Paso Robles Formation
Qt	Quaternary terrace deposits
T	Tertiary sediments
gr	Cretaceous (?) granite
M	metamorphic rocks

Fault (dashed where approximate, dotted where concealed)

Inferred fault

Figure 4.0-5 Surface Geology (after Dibblee 1971, Grove c. 1981, and Lomex Corporation c. 1981)

water in metasediments because it is 200 feet deep, whereas Red Wind main well (500 feet deep) probably taps water in granite. The water type and dissolved-solids concentrations of Mare Spring and drill hole 36-77 are similar. According to the Lomex Corporation's geologic map, drill hole 36-77 is in metasediments. The source of the water in Mare Spring is probably from granite and metasediments.

As shown in Table F.7 (Appendix F), except for drill holes 5-71, 24-77, and 36-77 and Mare Spring, the water at sampled wells and surface-water sites meets drinking water standards (U.S. Environmental Protection Agency 1976). Most drill holes are in the uranium ore deposits of the metasediments and may have radiochemical constituents which exceed Federal and state drinking water standards (Appendix B). A gross alpha value of 32.3 pCi/l in Mare Spring water is unexpected, particularly because radium-226 and uranium values are low for this sample (radium-226 0.15 pCi/l and uranium = 1.5 microgram/l). A re-analysis of this sample resulted in a value of <8.4 pCi/l for gross alpha particle activity. It is thought that radiochemical species of short half life (e.g., radon-222 and radium-224) were present in this sample (Albert Yang, USGS. 1981. Personal communication). Radon-222 is a gas that is soluble in water and has a half life of 3.82 days (Hem, 1970). Radium-224 has a half life of 3.64 days (Thatcher et al. 1977). Thus, the difference between the original analysis and the re-analysis probably reflects the decay of radiochemical species of short half life. This is also suggested by the continuous decrease in gross alpha values in this sample determined from hourly measurements during a 24 hour period. A sample in November 1980 from Mare Spring had a gross alpha value of <9.0 pCi/l.

4.4 GEOLOGY AND MINERALS

4.4.1 Regional Geology

The project area is situated in the La Panza Range, part of the Coast Ranges geomorphic province. This province is a group of northwest trending mountains and valleys along the Central and Northern California coast which are intersected by several major faults which divide them into structural blocks. The project area lies in the Salinian structural block, bounded on the west by the Nacimiento fault and on the east by the San Andreas fault. This block consists of a basement complex of metamorphic and granitic rocks of pre-Late Cretaceous age partly overlain by younger sediments (Late Cretaceous to Quaternary). The plutonic rocks vary in composition from granodiorite and quartz monzonite to quartz diorite (Ross 1972; Dibblee 1976; Hart 1976). Radiometric dates (potassium-argon) for the plutonic rocks range from 62 to 110 million years (late Cretaceous) (Hart 1976). The metamorphic rocks, which include gneiss, schist, granulite, quartzite, and marble, are most abundantly exposed in the Sur Series rocks of the Santa Lucia Range (Compton 1966), but also occur in the Santa Cruz, Gabilan, and La Panza Ranges. Poorly preserved fossils from the Gabilan Range indicate a probable Paleozoic age for at least part of the Salinian metamorphic rocks; however, Lomex Corporation (1978) geologists state that some metamorphic rocks in the La Panza Range may be as old as late Precambrian (600 million years or more). Uranium mineralization occurs principally in the metamorphic rocks.

4.4.2 Site Geology

4.4.2.1 Geomorphology

The project area is located on the northeast slope of the La Panza Range. Elevations in the La Panza Range vary from 1600 to 1800 feet in the lower canyon bottoms, to 3600 to 4000 feet on ridges. In the project area, elevations range from about 1800 feet at Exploration Areas A and B to about 2200 feet at Area C. Although slopes greater than 100% (45°) are common in the Range, maximum slopes in the project area are about 60% (about 30°) or less.

Regional geomorphology is strongly related to geology. The metamorphic rocks are generally the most resistant to erosion, and the younger sediments are the least resistant. The granitic rocks vary in erosional resistance according to the degree of fracturing and alteration they have sustained. Thus the relatively unaltered granitic rocks of Black Mountain have been highly resistant to erosion and form steep slopes, while granitic rocks in fault or shear zones are marked by low areas of modest relief. The northeast part of the La Panza Range has a complex drainage pattern due to the variety of rock types present. The dendritic pattern of the granitic area contrasting sharply with the linear trellis pattern developed on the younger sedimentary rocks east of Area A. The metamorphic rocks form an intermediate pattern of drainage which is similar to the drainage pattern of granite. The project sites are underlain by granitic and metamorphic rocks and show the coarse drainage texture and dendritic pattern characteristic of granite.

4.4.2.2 Rock Types

Three rock types are present in the project area: igneous, metamorphic, and sedimentary (Figure 4.0-5). The metamorphic rocks, which are the oldest, are enclosed and intruded by younger granitic rocks. Both metamorphic and granitic rocks are partly overlain by still younger sedimentary rocks.

Metamorphic rocks present in the project area include quartzite, biotite schist, and marble. These were originally sedimentary rocks (sandstone, shale and limestone, respectively) which were altered and recrystallized during emplacement of the granite. Quartzite is best preserved at Areas B and C. Fresher specimens from Area B contain abundant fine-grained disseminated pyrite, but in most surface exposures the pyrite has weathered to iron

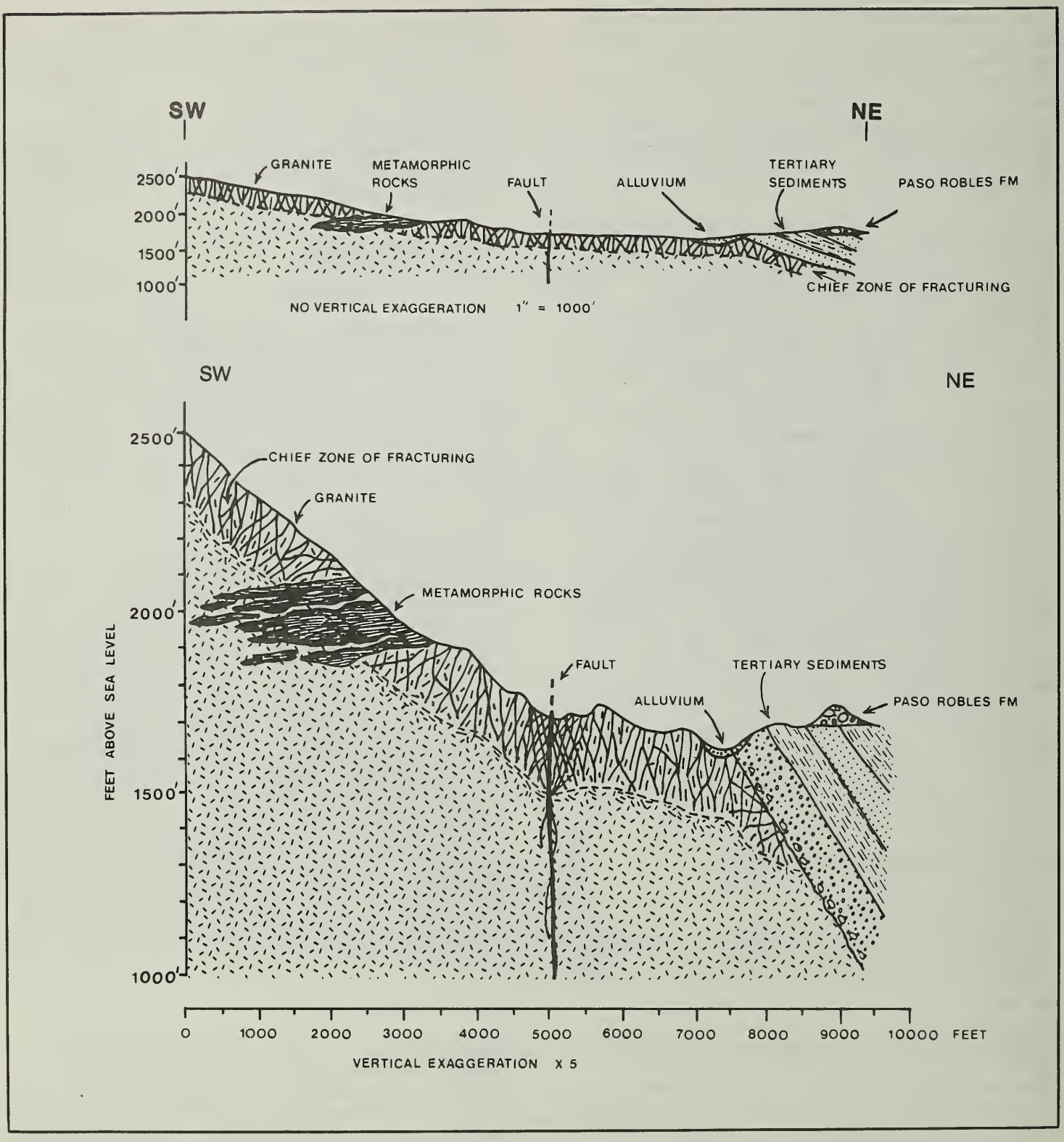


Figure 4.0-6 Diagrammatic Geological Cross-section SW-NE Through Area A

oxides. Accompanying liberation of sulfuric acid appears to have caused significant alteration of the quartzite, resulting in increased porosity and permeability. Medium to coarse-grained white marble is present at Areas A and B.

Most of the granitic rocks are deeply weathered, but some fairly fresh granite is exposed in creek beds and residual boulders. Composition varies from biotite granodiorite and quartz monzonite to quartz diorite (Ross 1972). Dikes of leucodiorite, aplite and pegmatite are abundant, but vein quartz is rare. Younger sedimentary rocks, though present in the general project area, are not represented at the three Exploration Areas, with the exception of Quaternary stream gravels which mantle stream bottoms at Areas A and B and form a terrace deposit at Area B.

4.4.2.3 Structure

The general structure of the project area is that of a fairly uniform body of granite which encloses several apparently discontinuous blocks of metamorphic rock, and is partially overlain by younger sedimentary rocks which dip gently to the northeast (Figure 4.0-6). The granite body is intersected by several west to northwest trending faults, some of which terminate and displace parts of the metamorphic blocks. The granitic and metamorphic rocks are also intersected by a number of joint sets and fracture zones, which form an extensive and pervasive fracture system. Using conservative simplifying assumptions based on observations made during field research, the minimum surface area of the fracture system is 6 sq ft/cu ft (0.6 sq m/cu m). The estimated total surface area for each Exploration Area is

- Area A, 7.7×10^9 sq ft (7.2×10^8 sq m)
- Area B, 8.7×10^9 sq ft (8.1×10^8 sq m)
- Area C, 8.0×10^9 sq ft (7.4×10^8 sq m).

None of the faults in the prospecting area give any evidence of quaternary movement in the aerial photographic or ground reconnaissance. The amount and direction of displacement of the faults are not known. The metamorphic rocks are not continuous in surface outcrop between the three drilling areas, and are probably not continuous in the subsurface.

4.4.3 Exploration Area Geology

4.4.3.1 Exploration Area A

The metamorphic rocks at Area A occur as a roughly horizontal to gently west-dipping slab of medium to thin-bedded quartzite and schist, thin vertically relative to its horizontal dimensions, surrounded by granite. To the northeast this metamorphic layer appears to be terminated by faulting. Dominant rock types are quartzite and biotite schist. Marble was observed as float in a limited area at the north end of the site.

4.4.3.2 Exploration Area B

At Area B the metamorphic rocks dip generally east and appear to be cut off by north-south and east-west trending faults (Lomex Corporation 1978). The metamorphic rocks are surrounded by and partially interlayered with granite. Metamorphic rock types at Area B are quartzite, schist, and marble. Bedding thickness is roughly 1 to 5 feet (0.5 to 2m) for quartzite and 5 to 35 feet (2 to 12m) for marble. Quaternary stream deposits overlie igneous and metamorphic rocks along Navajo and McGinnis Creeks and form a veneer of terrace deposits north of McGinnis Creek.

4.4.3.3 Exploration Area C

The metamorphic rocks at Area C are medium bedded quartzites and schists which dip moderately to the east. They appear to be surrounded by granite on three sides, but may be continuous with a larger body of metamorphic rocks which crops out to the east. This larger metamorphic block includes a section over 100 feet (30 m) thick of medium to thin bedded quartzite, schist, and marble.

4.4.4 Geologic Hazards

4.4.4.1 Landslides

Slope stability hazards for most of the project area are moderate to low (Figure 4.0-7). No landslides were mapped in any of the drilling areas.

4.4.4.2 Seismic Activity

Four faults or fault zones relatively near the prospecting sites are considered active or potentially active (Jennings 1975). The San Andreas fault, 15 miles east of the project area, has been active within historic times (ground breakage from the 1857 earthquake). The San Juan fault (8 to 9 miles east), La Panza fault (6 miles west), and Rinconada fault (15 miles west) are shown on Jennings' compilation (1975) as having Quaternary displacement, and therefore would be considered to be potentially active. Dibblee (1976) considers that the Rinconada fault is "probably inactive" and poses "little if any seismic hazard" compared to the San Andreas fault. The chief hazard in the area is from the San Andreas fault which has the potential for generating a major earthquake of magnitude 7 or greater (Richter scale).

TABLE 4.0-3

Uranium Anomalies in the Salinas Watershed

Location	Associated Geology
San Antonio River near Lockwood	Middle Miocene sedimentary rocks coincident with Jolon Fault
Harris Valley near Lockwood	Middle Miocene and Plio-Pleistocene Sedimentary rock
Lake San Antonio, especially Heritage Ranch	Fault contact between Middle/Lower Pliocene and Middle Miocene marine rocks
Estrella Creek near San Lawrence Terrace	Plio-Pleistocene nonmarine sedimentary rocks
Cholame	Contact between ultrabasic instrustive and Plio-Pleistocene nonmarine sedimentary rocks
Temblor Valley southeast of Still Lake	Plio-Pleistocene nonmarine rocks
Paso Robles	Plio-Pleistocene nonmarine sedimentary rocks
Upper Calf Canyon near Santa Margarita	Granite
Sycamore Creek near Salinas Reservoir	Upper Cretaceous marine

4.4.5 Uranium Deposits

California uranium deposits are generally small and low grade compared to those of the Colorado Plateau or Wyoming. There are indications that a low grade uranium province exists in the southern Coast Ranges which includes much of the southern Salinas River watershed. An airborne radiometric survey conducted in 1980 by the U.S. Department of Energy (1981) detected 35 uranium anomalies in the area of the San Luis Obispo sheet of the geologic map of California (California Division of Mines and Geology 1978), several of which fall within the Salinas River watershed (Table 4.0-3).

In the course of their regional exploration, Lomex Corporation measured radioactivity at outcrops along State Highways 41, 46, 58, and U.S. 101, San Marcos Road near Nacimiento Lake, and Huerhuero Road. Representative values obtained are summarized in Table 4.0-4.

TABLE 4.0-4

Specific Activity at Surface Exposures in San Luis Obispo County

Geologic Unit	Mean Specific Activity (microrem/hr)
Plio-Pleistocene Nonmarine (Paso Robles Formation)	16.5
Upper Miocene	13.0
Middle and Lower Miocene	12.0
Tertiary Intrusive	8.0
Upper Cretaceous	24.0
Lower Cretaceous	6.5
Franciscan	4.0
Granite	9.75

4.5 SOILS

4.5.1 General Description

The Exploration Areas are all situated in soil mapping unit 47, Trigo-San Andreas-Chualar families association on 10 to 50 percent slope (Los Padres National Forest 1982).

Trigo family soils make up 30 percent of the mapping unit. These are well drained to somewhat excessively well drained, very shallow (4 to 10 inches deep) to shallow (10 to 19 inches deep) soils. The soil texture is coarse sandy loam throughout the profile.

San Andreas family soils make up 25 percent of the mapping unit. These are well drained to somewhat excessively well drained, moderately deep (20 to 40 inches) soils. The soil texture is coarse sandy loam throughout the profile.

Chualar family soils make up 20 percent of the mapping unit. These are well drained, moderately deep soils (20 to 40 inches). The soil texture is coarse sandy loam in the upper 12 to 15 inches; sandy clay loam below this depth.

The remaining 25 percent of the mapping unit is occupied by inclusions of Millrace families, Xerocrepts, and rock outcrops.

All three major component soils are very sensitive to erosion because of the physical characteristics of the poorly aggregated coarse textured surface horizons. Soil fertility status is low to moderate with nitrogen water holding capacity and possibly sulfur being most limiting factors to plant growth.

4.5.2 Site Specific Properties

4.5.2.1 Exploration Area A

Slopes range from 25 to 40%. Vegetation is chamise-chaparral underlain by Trigo family soils. Slight to moderate sheet and rill erosion is occurring on undisturbed sites. Substantial sheet, rill, and gully erosion is occurring on the existing access road from Fernandez Road to Exploration Area A and ORV trails. Drainages have alluvial soil under scattered live oak.

4.5.2.2 Exploration Area B

Northwest of McGinnis Creek slopes range from 30 to 55%. Vegetation is chamise-chaparral interspersed with a few other species of hard chaparral and underlain by Trigo family soils. Slight to moderate sheet and rill erosion is occurring on Forest Road 28S02, on the shortcut from McGinnis Creek north to benchmark 1927 on a powerline right-of-way north of McGinnis Creek and on ORV trails.

Southwest of McGinnis Creek slopes range from 25 to 55%. Vegetation is mixed hard chaparral on the north aspects underlain by Chualar family soils. The remainder of the site has annual grasses, scattered blue oak, and digger pine with some patches of mixed brush underlain by San Andreas family soils and Chualar family soils. Slight sheet and rill erosion is occurring on undisturbed sites. Substantial sheet, rill, and gully erosion is occurring on the roads adjacent to McGinnis and Navajo Creeks and the access road to powerlines south of McGinnis Creek in Sec. 29, R. 29 S., T. 16 E.

4.5.2.3 Exploration Area C

Slopes range from 25 to 60%. Vegetation is chamise-chaparral underlain by Trigo family soils. A portion of the area south of the powerlines has vegetation of annual grasses, scattered blue oak, and digger pine underlain by Chualar and San Andreas family soils. Slight to moderate rill erosion is occurring on undisturbed sites. Substantial sheet, rill, and gully erosion is occurring on the access road to Area C, a powerline right-of-way south of Leaf Spring and ORV trails.

Roads, right-of-way, and ORV trails show gully erosion on their adjacent slopes because of poor drainage and poor water bar construction.

4.6 VEGETATION

The vegetation in the vicinity of this project reflects the combined influences of the mediterranean climate and the La Panza mountain range. The three major community types are chamise chaparral, digger pine-oak, and deciduous riparian.

4.6.1 Major Communities

4.6.1.1 Chamise Chaparral

Chamise chaparral communities are characterized by a dominance of chamise (Adenostoma fasiculatum) occurring in open to dense stands. Other species found in this association are typical of chamise chaparral communities. Overstory species identified on the Exploration Areas include wedgeleaf ceanothus (Ceanothus cuneatus), yerba santa (Eriodictyon tomentosum), redberry (Rhamnus crocea), deerweed (Lotus scoparius), snowberry (Symphoricarpus vaccinoides), buckwheat (Eriogonum fasiculatum), elderberry (Sambucus mexicana), yellow gooseberry (Ribes quercetorum), chaparral currant (R. malvaceum), poison oak (Toxicodendron diversiloba), and black sage (Salvia millifera).

Understory species found in the chaparral community vary from nothing to a well developed annual grass-forb association. Species found in these areas commonly include, but are not limited to: soft chess (Bromus mollis), ripgut brome (B. rigidus), red brome (B. rubens), filaree (Erodium botrys), death camus (Zigadenus venenosus), shooting star (Dodecatheon sp.), burr clover (Medicago hispida), and thistle (Centaura sp.).

4.6.1.2 Digger Pine-Oak

The digger pine-oak community is characterized by digger pine (Pinus sabiniana), blue oak (Quercus douglasii) and lesser amounts of interior live oak (Q. wislizenii). These species rarely occupy more than 50% of the overstory canopy.

The understory vegetation consists of a light shrub mixture (less than 50% canopy cover) and an annual grass-forb association. Species found in this understory include wedgeleaf ceanothus chamise, snowberry, poison oak, mountain mahogany (Cercocarpus betuloides), redberry, buckwheat, yerba santa, purple needlegrass (Stipa pulchra), soft chess, ripgut brome, red brome, slender wild oats (Avena barbata), filaree, deerweed, shooting star, paint-brush (Castilleja sp), and California poppy (Eschscholzia californica).

4.6.1.3 Riparian Deciduous

The riparian deciduous plant community occurs only along McGinnis and Navajo Creeks in Exploration Area B. Road construction and heavy off-road motorcycle use have altered the condition of this community by eliminating portions of the native vegetation. Characteristic species found at this site include California sycamore (Platanus racemosa), Fremont cottonwood (Populus fremontii), digger pine, poison oak, interior live oak, soft chess, red brome, filaree, thistle, and turkey mullien (Eremocarpus sitigerous).

TABLE 4.0-5

Vegetative Communities by Exploration Area

	CHAMISE CHAPARRAL	DIGGER PINE-OAK	RIPARIAN DECIDUOUS
Area A	95	5	0
Area B	61	13	26
Area C	100	0	0

4.6.2 Threatened and Endangered Plant Species

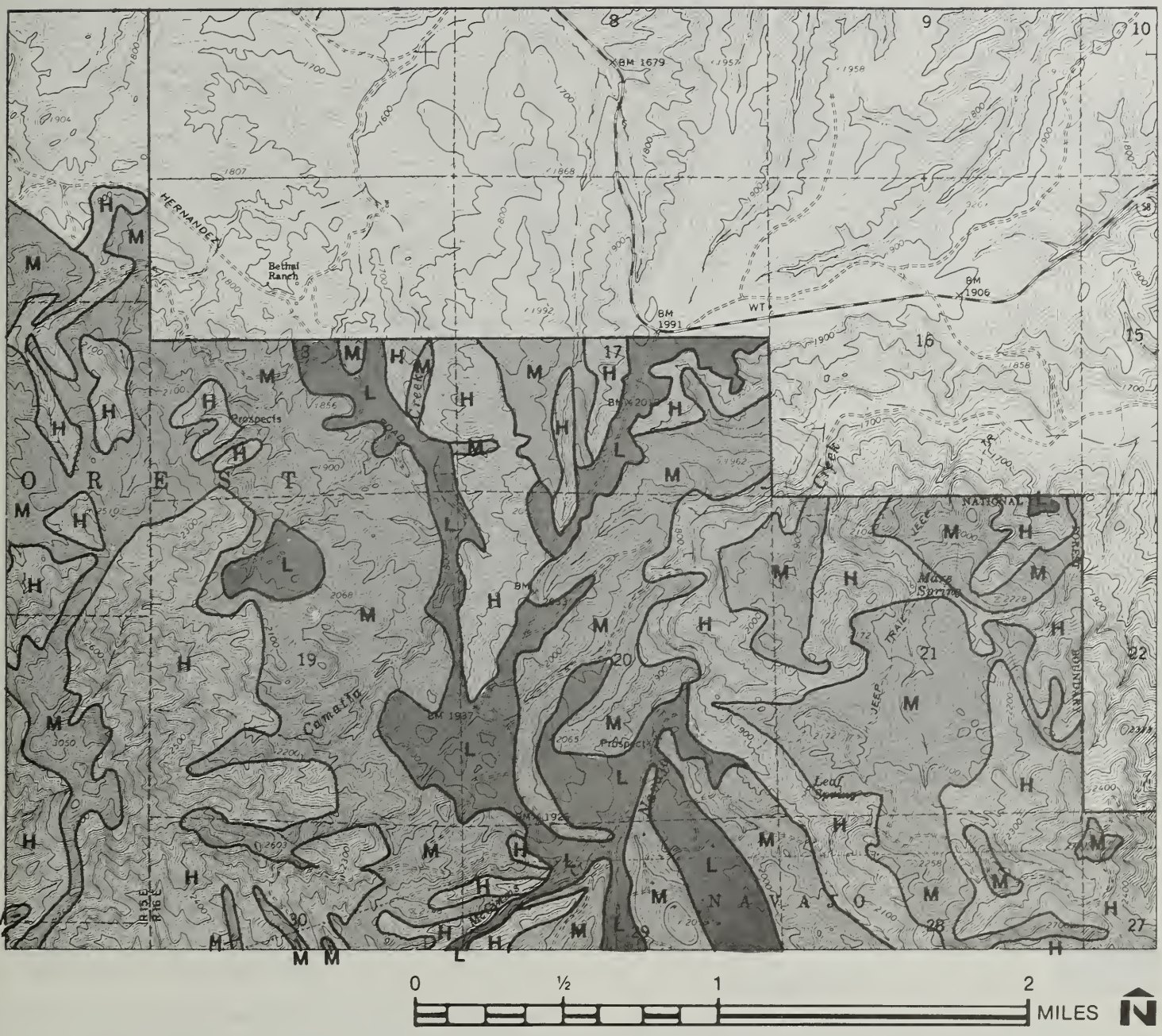
No sensitive plants occur at the three Exploration Areas. However, 150 to 200 individuals of Chlorogalum purpureum var. reductum, a sensitive plant, occur in the bed of an abandoned county road (Figure 4.0-8) situated approximately 0.9 mi (1.4 k) east of Area A.

4.7 WILDLIFE

4.7.1 General Description

Sixteen game and fur bearing species are known to use the habitat types found in the vicinity of the project. All of the species except for band-tailed pigeon (Columba fasciata) probably breed in the study area. These species include:

California Valley Quail	Lophortyx californicus
Mountain Quail	Oreotyx pictus
Band-tailed Pigeon	Columba fasciata
Mourning Dove	Zenaida macroura
Opossum	Didelphis virginiana
Brush Rabbit	Sylvilagus bachmani
Desert Cottontail	Sylvilagus audobonii
Black-tailed Jackrabbit	Lepus californicus
Coyote	Canis latrans
Gray Fox	Urocyon cinereoargentus
Black Bear	Ursus americanus
Raccoon	Procyon lotor
Badger	Taxidea taxus
Western Spotted Skunk	Spilogale gracilis
Striped Skunk	Mephitis mephitis
Mountain Lion	Felis concolor
Bobcat	Lynx rufus
Columbian Blacktailed Deer	Odocoileus hemionus columbianus

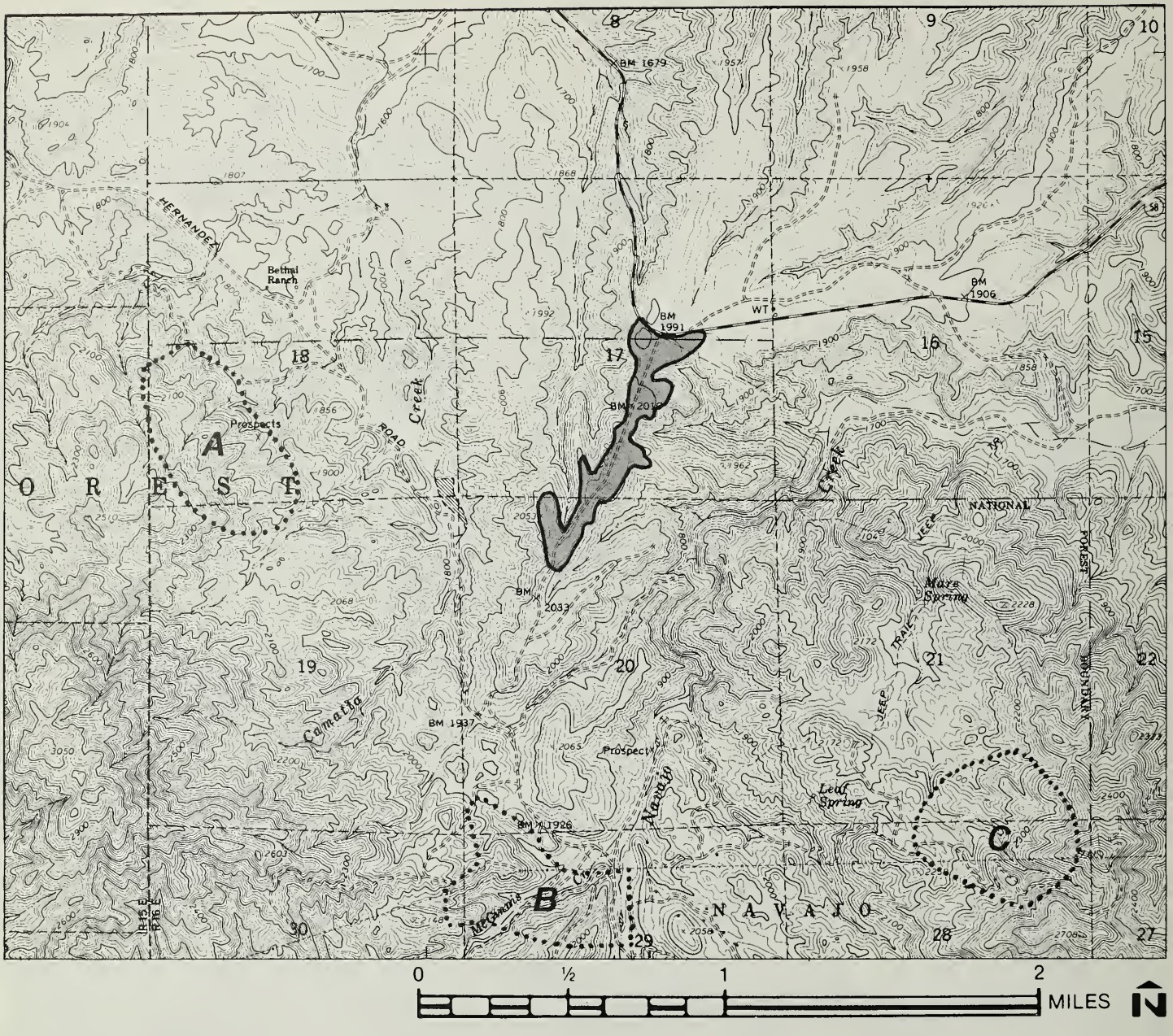


H High Sensitivity

M Moderate Sensitivity

L Low Sensitivity

Figure 4.0-7 Slope Stability Hazards Map



Exploration Area

Camatta Canyon Amole Boundary

Figure 4.0-8 Surveyed Distribution of Camatta Canyon Amole

Other mammals, birds, reptiles, and amphibians using this area are those common to chaparral and oak woodland habitat types.

4.7.2 Sensitive, Threatened or Endangered Species

No Federally listed threatened or endangered species are known to use the area in the vicinity of the proposal. The California Condor (Gymnogyps californianus) and Peregrine Falcon (Falco peregrinus), endangered species on Federal and state lists, are rarely observed in the area and do not depend upon it for habitat. There is an historic condor nest site located approximately six miles southeast of the proposal but it has not been active for at least 15 years. A four square mile area around the former nest site has been designated as critical condor habitat by the Secretary of Interior.

Golden Eagles (Aquila chrysaetos) and Prairie Falcons (Falco Mexicanus) are expected to commonly use the vicinity of this proposal for foraging habitat. Neither species is officially listed as threatened or endangered but they are managed as sensitive species by the Forest Service.

4.7.3 Wild Horses

The Wild Horse and Burro Act of 1971 (Public Law 92-195), as amended, provides for the protection, management, and control of wild, free-roaming horses on National Forest System land. This Act directs public land management agencies to manage wild horses as integral components of public land within territories as established in 1971. Such management should be in coordination with other resources as specified in the Multiple Use-Sustained Yield Act of 1960. The Black Mountain Wild Horse Territory was established in compliance with the 1971 Act.

The wild horses are descended from stock allowed to roam free by the Bethal Family after World War I. The herd consisted of six animals in 1970 but is believed to have been as large as 50 to 60 animals in the past. The herd presently consists of ten animals including four mares recently introduced from the Modoc National Forest.

The Wild Horse Management Territory is situated west of the areas proposed for mineral exploration (U.S. Forest Service 1979b). Exploration Area A is situated about 3000 feet (approx. 1 km) east of their all-year range and Exploration Area B is situated about 4,500 feet (approx. 1.3 km) east. Forest Service management direction is to manage the movement of the herd to land within the established territory. However, the herd is known to range into Exploration Areas A and B. The territory and the approximate range of the herd are shown in Figure 4.0-9.

4.8 NATURAL RADIATION ENVIRONMENT

Ionizing radiation in the natural environment, or "background radiation," is the principal source of radiation exposure to humans. The dose equivalent rate averages about 130 millirem per person per year in the United States (U. S. Environmental Protection Agency 1972.) Such exposure is composed of doses from a complex environmental radiation field derived from various sources which affect human tissues in varying ways. Average annual whole-body doses in the United States are derived from dietary, medical, and other sources, as well as the natural environment.

Field measurements of background radiation have been made in the project area. Exploration Areas B and C showed little elevated radioactivity above typical nationwide background levels. Portions of Exploration Area A are characterized by levels of radioisotopes of uranium and thorium which exceed typical nationwide background levels (U. S. Environmental Protection Agency 1981). Results of the radiation study are summarized below for each Exploration Area.

4.8.1 Exploration Area A

The mean local background level of gamma emitters is 16.1 microrem/hr. Higher levels of gamma emitters occur where outcrops of mineralized rock are naturally or technologically exposed. These values range from 46.4 to 20.2 microrem/hr and have a mean value of 31.2 microrem/hr. Concentration of radionuclides from the uranium decay series (U-238, U-234, Ra-226, Po-210), Cs-137, and Th-232 in the soil were within typical nationwide background levels with the exception of samples taken from mineralized exposures.

4.8.2 Exploration Area B

The mean local background level of gamma emitters in Area B is 14.5 microrem/hr. Slightly elevated levels occur in the vicinity of mineralized formations truncated by McGinnis Creek. Radionuclides in the soil at Area B were within typical nationwide background levels.

4.8.3 Exploration Area C

The mean local background level of gamma emitters in Area C is 13.7 microrem/hr. Radionuclides in the soil at Area C were within typical nationwide background levels.

4.9 SOCIAL AND ECONOMIC ENVIRONMENT

4.9.1 Regional Demography and Economy

The proposed exploration project lies within San Luis Obispo County, an area which has experienced an unusually high rate of population growth during the 1970's. During the first half of the decade, the county population grew by 25 percent. The county

seat, San Luis Obispo, had a population of 33,800 in 1976 and accounted for one-fourth of the county's population.

Nearly one-third of all wages and salary employment within San Luis Obispo County is generated by the government sector, predominately state and local levels. Because the government is not dependent on local demand, the economy is considerably dependent upon the government sector for much of its prosperity. Other sectors important in the county's employment base are the retail trade and services sectors. Adding employment in these sectors to employment in government sectors accounts for 70 percent of total employment in 1975. Agricultural employment was about five percent of total county employment in 1975 and mining was negligible.

4.9.2 Land Ownership, Residence, and Community Characteristics

In the immediate vicinity of the proposed exploration project there are 27 different owners of private property both within and adjacent to the National Forest boundary. Almost half the owners (13) are from outside the county, with three being from outside the state. Dwellings exist on 20 of the properties but only five are occupied full time. The rest are used periodically for recreational purposes. The residential sites are shown on Figure 4.0-10.

With the exception of the Red Wind Foundation population, most of the other permanent residents are retired. Currently there are about 80 people in the Red Wind community, but the population is believed to fluctuate. Some members work outside the area while others remain on the property.

4.9.3 Commerce

The major economic activity surrounding the proposed project is cattle ranching. The Exploration Areas are within the boundary of the Navajo-Black grazing allotment. Up to 18 head of sheep and goats graze on the potentially affected portion of this allotment.

The La Panza area is subject to a large amount of mineral speculation as evidenced by the hundreds of mining claims encumbering the land, but presently mineral exploitation is not a major economic activity.

4.9.4 Transportation

The principal transportation artery is State Highway 58, which connects the upper Salinas River area with the San Joaquin Valley. Unpaved Forest Service roads provide the principle means of access to the Exploration Areas and to private property from Highway 58 and connect the project area with Pozo and La Panza. These unpaved roads average 14 feet in width.

4.9.5 Religious Values

Community research to determine potential impacts on religious values was done in the project vicinity. This research was initiated after public input identified the practice of Indian religion as an issue in developing this environmental impact with residents and former residents of Red Wind Foundation; members of the Salinan and Chumash Indian communities not associated with Red Wind Foundation; and non-Indian residents and former residents of the Navajo/La Panza area.

The interview program focused on two of three principal areas of concern in preserving the practice of Indian religion, as expressed in the American Indian Religious Freedom Act (P.L. 95-341; 92 Stat. 469; U.S.C. 1996): (1) access to sacred sites as required for religious activities, including cemeteries; and (2) freedom from disruption of or interference in traditional American Indian ceremonies. The third area of concern, possession, and use of sacred objects necessary for exercise of religious rites and ceremonies, also arose and was documented during the interviews.

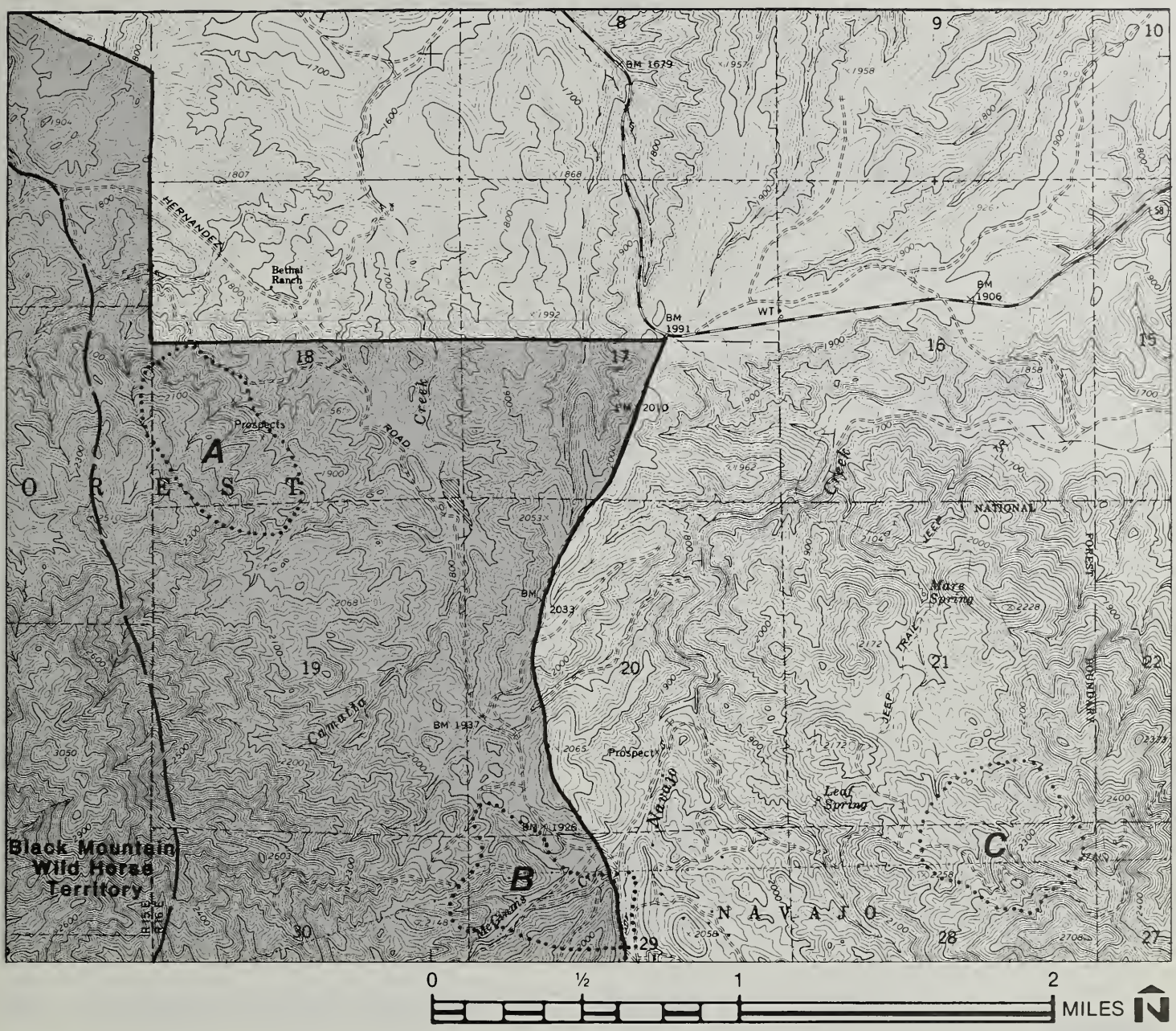
Interviewees identified sites or areas in the project vicinity which they considered to be of religious importance. These included such topographic features as Black Mountain, archeological sites, and contemporary religious (shrine) sites. One archeological site identified during the interviews is situated within the project's zone of potential environmenal impact. A single site of potential religious importance was discovered during the archeological field survey ("Area A Shrine Site", F.S. 05-07-53-254E). Red Wind Foundation did not respond to direct inquiries about the value and/or current use of this site.

4.10 RECREATION

The topography, climate, and vegetation of the project area are not conducive to a wide range of recreational activities. Current and projected recreation use of the project area is low compared to more favorable areas on the National Forest. There are no developed campgrounds within the project area; Navajo Camp is the nearest such facility, situated approximately 1.5 miles west of Exploration Area B.

Offroad vehicle use is the principal form of recreation in the area, constituting approximately 75% of all recreation use. This use is distributed across an extensive network of trails in Exploration Areas A and B and surrounding land. Exploration Area B contains one site of concentrated motorcycle use popularly known as "Motorcycle Flat."

Exploration Area A does not receive significant offroad vehicle (ORV use). The remaining significant forms of recreation are deer hunting and placer mining for gold.



Approximate Range of Wild Horse Herd on Federal Land

Exploration Area

Figure 4.0-9 Wild Horse Territory and Approximate Range

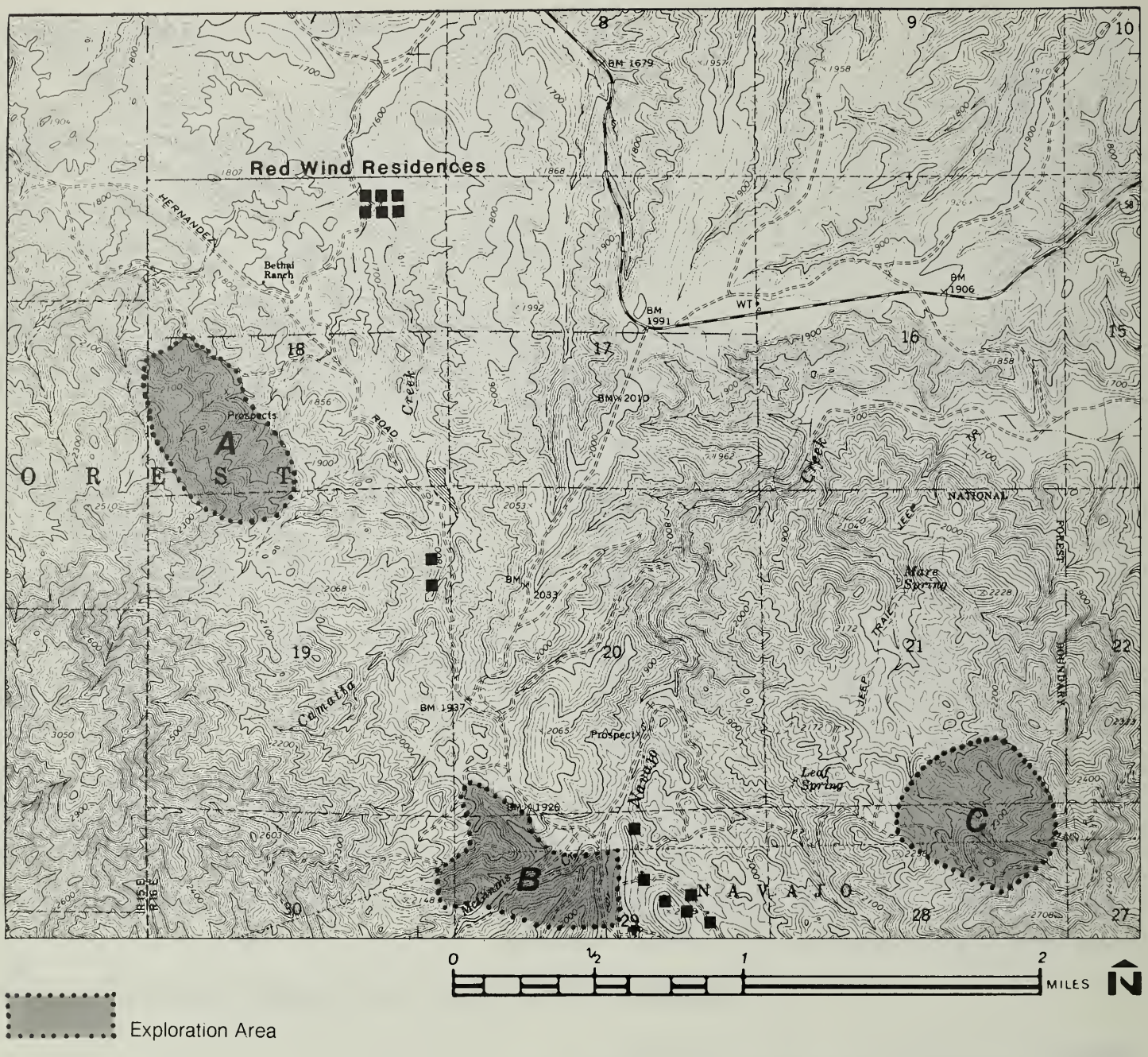


Figure 4.0-10 Approximate Location of Residences and Vacation Homes

ORV use is principally concentrated in the period from late fall to late spring. Such use is minimal during the hot, dry summer months. Deer hunting is limited to August and September by the California Department of Fish and Game. Recreational gold mining (primarily with pan and sluice box) occurs primarily during the wet season but continues perennially on portions of Navajo Creek. The total annual visitor days of use is 9500; total visitor days for July and August is estimated at 1500 (16% of total annual use).

4.11 BLACK MOUNTAIN FURTHER PLANNING AREA

Exploration Area A (108 ac; 44 ha) is situated within the Black Mountain Roadless Area Review and Evaluation (RARE II) Further Planning Area (Figure 4.0-11). The Black Mountain Further Planning Area consists of about 16,000 ac (6,475 ha); approximately 0.007 percent of the project area is on the Black Mountain Further Planning Area. Further Planning Areas are lands on which decisions are pending on wilderness status. A portion of this Further Planning Area was extensively explored for minerals in the 1950's. Evidence of such exploration includes an access road, drill pads, cores, and bulk sampling pits.

In the RARE II process, roadless areas were examined for the degree to which each area possessed the following attributes required or mentioned by the Wilderness Act of 1964: (1) natural integrity; (2) apparent naturalness; (3) outstanding opportunities for solitude; (4) opportunities for primitive recreation; and, (5) supplementary attributes such as ecological, geological, scenic, and cultural features. The Black Mountain Further Planning Area reflects these attributes to the following degrees:

- has a natural integrity with low disturbance on natural processes and less than 15 percent of the area is impacted by human activities
- is viewed as natural by many Forest visitors but contains human impacts apparent to other Forest visitors
- has low opportunities for primitive recreation because the area has only moderate vegetative and topographic screening and has many permanent off-site intrusions
- has low opportunities for primitive recreation because of the homogenous quality of the area and the low opportunity for solitude
- does contain a population of sensitive plants and provides habitat for a small herd of wild horses.

On the comparative scale, the Black Mountain area was rated only moderate for wilderness attributes.

The Environmental Impact Statement for RARE II (U.S. Forest Service 1979) states that "Development activities such as timber harvest, road construction and other activities that may reduce wilderness potential of the land will be prohibited. Activities permitted by prior rights, existing law, and other established uses may continue pending final disposition of the RARE II Areas." Mineral exploration on existing claims established under the General Mining Law of 1872 is permitted in RARE II Further Planning Areas.

4.12 VISUAL ENVIRONMENT

4.12.1 General

The affected environment consists of the Exploration Areas and associated viewsheds. Landforms and vegetative patterns of the Exploration Areas are typical of the region. The existing condition of the visual environment and the ability of the Exploration Areas to absorb changes are summarized below. The recommended objective for visual quality in the project vicinity is for management activities, including mineral exploration, to visually subordinate to the characteristic landscape. This recommended objective is not currently met on approximately half of the total area of the Exploration Areas.

4.12.2 Exploration Area A

Approximately 45% of Area A appears to be untouched by human activities. Fifty percent of the Area contains noticeable minor disturbance with natural appearance of the landscape remaining dominant. The remainder of the Area (5%) contains changes which are visually dominant but tend to resemble natural patterns when viewed from a distance. The ability of Area A to absorb visual impacts is low because of the presence of steep to moderate slopes and vegetation with low screening potential. The Area is a focal point for approximately two miles east on Highway 58 and is also visible from Fernandez (29S02) and Navajo (29S15) roads.

4.12.3 Exploration Area B

This site has been extensively modified by motorcycle and all-wheel drive vehicles, a powerline, fuelbreak, and roads. In 40% of the Area, these modifications are visually dominant but tend to resemble natural patterns when viewed from a distance. In 45% of the Area, these modifications are easily noticed and may attract some attention. Modifications are not evident in the remaining 15%. The ability of Area B to absorb visual impacts ranges from low to medium because of gentle to steep topography and vegetation with variable screening potential. The Area is visible as immediate foreground from Navajo and McGinnis roads.

4.12.4 Exploration Area C

Sixty percent of Area C is natural appearing with minor disturbances resulting from fuelbreaks and

trails. The remainder (40%) contains a dirt road, a powerline with associated vegetative clearing, minor fuelbreaks, and other linear clearings. Such changes are easily noticed but resemble natural patterns when viewed from a distance. Absorptive capability is low in most of the Area but on gentle slopes the absorptive capability is moderate. The Area is visible from Highway 58, local secondary travelways, and Black Mountain at distances ranging from one and one-half to five miles.

4.13 ARCHEOLOGICAL AND HISTORICAL VALUES

Archeological and historical research was done in the project vicinity. One prehistoric archeological site (site No. F.S. 05-07-53-236) has been discovered within the zone of potential impact of the project. This site primarily consists of discontinuous clusters of stone artifacts, debris from their manufacture, and animal bone. Sites of historic remains are also situated within the project's zone of potential impact. Each of these sites is a valuable cultural resource.

4.14 NOISE

Land uses in or near the project area which contribute to ambient noise are indicative of the multiple uses of National Forest System land. Existing uses include public rights-of-way, agriculture, motorized and non-motorized recreation, mining and prospecting, and residence.

Recreation activities are minimal in the area during the hot summer months proposed for the project.

Background noise level measurements were made in the project area on 9 September 1981 by the California Office of Noise Control. The project area during the period of measurement was very quiet. No vehicular traffic was observed, although jet aircraft were observed and heard.

Measurements were made at Exploration Areas A and B. It was assumed that ambient noise at Area C would closely approximate levels at Area A because the sites are similarly remote and similarly situated on sideslopes. The measurements for Areas A and B are summarized below (Table 4.0-6).

TABLE 4.0-6

Background Noise Levels

	L_{max} (Maximum Noise)	L_{min} (Minimum Noise)	L_{eq} [a]
Area A	42 dB(A)	23 dB(A)	29 dB(A)
Area B	50 dB(A)	25 dB(A)	35 dB(A)

[a] L_{eq} can be thought of as a sound of constant intensity which is equivalent in terms of acoustic energy present in a sound varying in intensity over time.

4.15 WILDLAND FIRE

The interior Salinas River watershed has a record of infrequent fires when compared to other watersheds on Los Padres National Forest. Between 1970 to 1980 four wildfires occurred in this watershed on the National Forest: three man-caused, one lightning caused. These fires burned on watershed with estimated values of $200 per acre.

In or adjacent to the project area there have been four large fires since 1945, as shown in Table 4.0-7 below.

TABLE 4.0-7

Fire History of Project Area

Fire Name	Exploration Area	Date of Fire	Size of Fire
Red Fire	A	Sept, 1979	1,500 ac (600 ha)
Navajo-Black Fire	B	Aug, 1951	16,000 ac (6,500 ha)
Robinson Fire	B	May, 1968	500 ac (200 ha)
Navajo Fire	C	August, 1946	3,000 ac (1,200 ha)

The available burnable vegetation per acre (fuel loading) depends primarily on vegetation type. In general, fire hazard and resistance to suppression increase with the increase of fuel load. Fuel loadings for the three Exploration Areas are shown in Table 4.0-8 below.

Although fire danger is low compared to other watersheds, there is a significant possibility of wildfire occurrence in the overmature fuels adjacent to Exploration Areas B and C. The recent Red Fire removed overmature brush from Area A.

TABLE 4.0-8

Fuel Loadings of Exploration Areas

Exploration Area	Major Fuel Type	Fuel Loading (tons per acre)	(Metric tons per hectare)
A	(chamise and grass)	1.6 - 3.0	4.3 - 8.2
B	(chamise)	7.0 - 15.0	19.0 - 41.0
	(mixed chaparral)	20.0 - 35.0	54.0 - 95.0
C	(chamise)	7.0 - 15.0	19.0 - 41.0

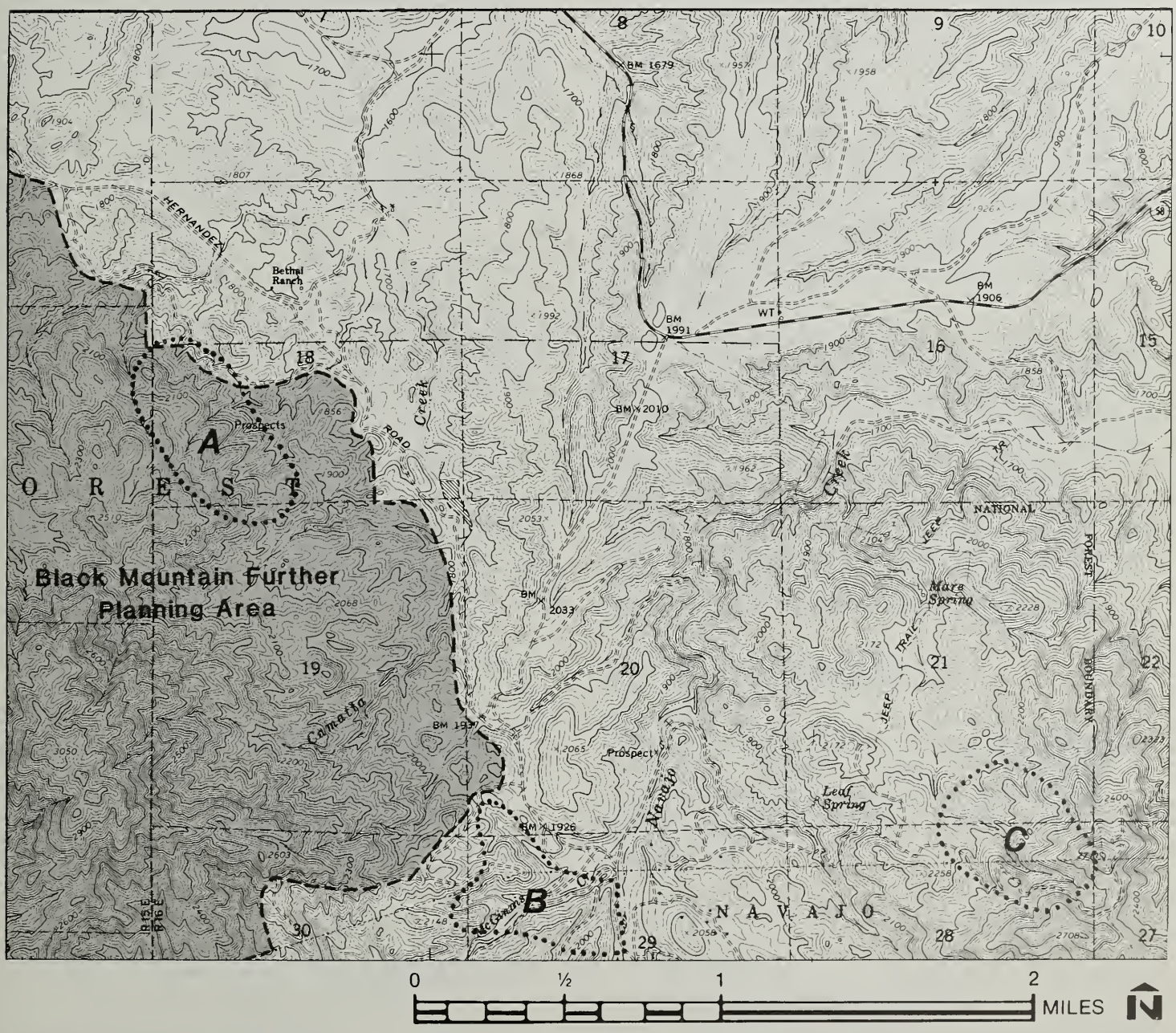


Figure 4.0-11 BLACK MOUNTAIN FURTHER PLANNING AREA

5.0 ENVIRONMENTAL CONSEQUENCES

5.1 INTRODUCTION

This chapter of the environmental impact statement describes the consequences to the environment that will result from implementation of each alternative. Anticipated consequences have been quantified where possible. Certain elements of the environment lend themselves to quantification better than others. For those elements which are difficult to quantify, qualitative statements are made to describe relative differences of the consequences of each alternative. Attention has been paid, where appropriate, to distinguishing effects which are direct, indirect, cumulative, or unavoidable. Also included are brief discussions on long and short term relationships of effects, and any resource commitments which are irreversible or irretrievable. No cost/benefit analysis has been performed since the principal output of the proposed work would be information.

5.2 AIR QUALITY

Changes in air quality may result from the introduction of drilling fines, vehicle dust, and fumes from drilling power sources and vehicles into the atmosphere (Alternatives One, Three, Four and Five). However, the mountainous terrain will enhance the dispersion and mixing of potential pollutants. The project area is remote and the surrounding area is devoid of industrial development. No permits from the Air Pollution Control District are required. However, equipment and operations are subject to District Rule 401, "Visible Emissions"; therefore the District must be notified when operations begin. Alternative Two would have no effect on air quality.

5.2.1 Dust

Visible emissions, primarily dust, can result from the use of compressed air to remove cuttings. Since the proposed method of drilling involves the injection of a mist of water and detergent into the downhole air stream, airborne dust will be substantially reduced over dry drilling. Water mist is introduced when drilling at depths exceeding 6.6 metres (22 ft).

The dust fraction from dry drilling (drilling depths of 0 to 6.6 m) of the typical well is estimated to be 2.1 kg (4.6 lbs). Since two holes could be drilled each day, the 24-hour dust production from drilling would be 4.2 kg (9.2 lb).

Fugitive dust concentrations from vehicle and equipment travel on dry roads are expected to occur intermittently. The estimated dust from project related vehicles and equipment over a 24-hour period is 127 kg (279 lb).

The estimated cumulative 24-hour fugitive dust from vehicles and drilling is 131 kg (288 lb). It is expected that this 24-hour value will not exceed the Federal secondary 24-hour particulate standard (150 micrograms/cu m).

5.2.2 Fumes

Operation of most equipment connected with the project will be intermittent, infrequent, and distributed throughout the project area. The drilling power source will run continuously in one location for one day. The U.S. Environmental Protection Agency (1980) estimated that 11.2 liters of diesel fuel are required to drill 1.0 m. The maximum daily amount of drilling is 152 m, thus a maximum of 1700 liters (450 gal) of diesel fuel would be used each day. The principal emissions from the drilling power source are sulfur oxides, carbon monoxide, nitrogen oxides, and hydrocarbons. Based on U.S. Environmental Protection Agency (1973) estimates of emission rates for heavy duty construction equipment, atmospheric pollutant concentrations from the drilling power source are insignificant.

Alternative Two would result in no additional fumes or dust. Alternatives One, Three, and Four would result in small amounts of pollution from fumes and dust estimated above. Alternative Five would result in a slight increase in the total amount of dust and fumes from the program of geotechnical study. It is estimated that dust and fumes resulting from Alternatives One, Three, Four and Five would not violate National Ambient Air Quality Standards. The effects of atmospheric emissions are not expected to be cumulative over time. No indirect or irretrievable/irreversible effects are expected.

5.3 WATER RESOURCES

Alternative Two would have no effect on water resources and there would be no gain of information on the water resources. Elements of Alternatives One, Three, Four and Five have the potential to directly or indirectly affect the quality and/or quantity of ground and surface water. These project elements are

- Groundwater pumping
- Drill holes
- Potentially hazardous cuttings.

Under Alternatives One, Three, Four and Five, water would be removed from the underground aquifer by pumping. Approximately 100 to 200 gallons (380 to 760 liters) would be removed from each drill hole (Lomex Corporation will obtain all necessary water rights). A total of approximately 10,000 gallons

(38,000 liters) would be removed during each year of operations. This removal of groundwater is a minor but unavoidable, short term, direct consequence of Alternatives One, Three, Four, and Five. The loss of such water to other users in the immediate area is irretrievable but the effect is reversible through subsequent normal groundwater recharge from precipitation.

Concern over the effect of drill holes on water quality has focused on two avenues of potential contamination: entry of surface water into the annular space of a drill hole, and mixing of deleterious water from one aquifer with good quality water from another aquifer by vertical migration within the annular space.

Entry of deleterious surface runoff water into groundwater via drill holes is a possibility. The introduction of such water may result in potential long term effects in all Exploration Areas. If such contamination would result in deterioration of water quality below Federal drinking water standards (refer to Appendix B), an irretrievable loss would result to local users. However, such loss would be reversible since techniques are available for improving groundwater quality. In Area B, groundwater contamination by surface runoff in existing drill holes (refer to Appendix I) and proposed drill holes would result in a cumulative effect of unknown extent. The effects of surface runoff on groundwater quality can be avoided through the mitigation measures developed for Alternatives Four and Five, including sanitary seals and proper abandonment procedures (refer to Appendix D).

Interaquifer exchange in the annular space of the drill holes is unlikely for two reasons. First, all available data from the Forest Service, USGS, and the Lomex Corporation indicate that groundwater in the area occurs in thoroughly fractured rock under water table or unconfined conditions. The data also indicate that there is only a single aquifer and thus that it is unlikely interaquifer exchange would occur (refer to Section 4.3). Second, the estimated surface area available for water movement created by the proposed drilling program does not represent a significant increase over the estimated surface of the natural joint system of the bedrock (refer to Sections 4.4.2.3 and 5.4).

In the unlikely event of interaquifer exchange of deleterious water, a long-term, direct impact on water quality would result. Such an impact would be cumulative with the groundwater effects of existing drill holes in Area B and uncased wells in mineralized zones on private land adjacent to Area A. Such impacts would constitute an irretrievable but reversible loss of drinking water to local users. Interaquifer exchange can be avoided by sealing off zones of deleterious water. Alternatives Four and Five (refer to Appendix D) provide for isolating zones of deleterious water according to State of California standards.

Groundwater pumping may introduce deleterious water into stream channels. This deleterious water would produce a short term, localized effect on stream water quality. This effect would be lessened or avoided by incorporation of discharge requirements into the modified Plan of Operations. Alternatives Four and Five provide such relief (refer to Appendix D) while Alternatives One and Three do not.

Cuttings removed from each drill hole would accumulate in a roughly circular area approximately 25 ft (7.6m) in diameter with a typical maximum thickness of 0.36 in (0.9 cm). Approximately 6% of these cuttings may exceed background radiation levels, with total specific activity of 5.6 to 14 pCi/g in the typical case and 840 pCi/g in the worst case (peak ore grade). These cuttings may migrate to adjacent surface water by transportation in runoff and produce a direct, long term change in water quality. Given the low specific activity of the material involved, the extent of such an effect is expected to be minimal. In Area B, the effects of cuttings from proposed drill holes are cumulative with the effects of cuttings from existing drill holes. However, surface water quality data from the vicinity of Area B indicate that the effects of existing cuttings on water quality are not significant. The effects of potentially hazardous cuttings on surface water quality can be minimized through a program of cuttings management. Alternatives Four and Five provide such a program; Alternatives One and Three do not.

5.4 GEOLOGY AND MINERALS

Alternative Two would have no effect on geology or minerals but no information would be developed on geology, mineralization and ground water. Alternatives One, Three, Four and Five will result in development of information on geology, mineralization, and groundwater. Indirect benefits of this information are considered in the social and economic element of this environmental analysis.

Alternatives One, Three, Four and Five would generate geology-related, direct, unavoidable, and irreversible impacts. These impacts are

- Removal and relocation of rock
- Creation of additional avenues for groundwater movement.

Removal and relocation of rock would amount to 65.3 cu yd (51 cu m) for the maximum number of drill holes. The effects of such removal in Exploration Area B are added to rock removed and relocated in previous drilling to determine cumulative volume. Cumulative approximate volume of material removed in Area B is 23.3 cu yd (17.8 cu m); when combined with such material from Areas A and C, a total volume of 70.6 cu yd (54 cu m) will have beeen removed. The total volume of removed and relocated materials,

including the cumulative effects of previous drilling, is small.

The extensive and pervasive fracture system described in Section 4.4.2.3 provides avenues for movement of groundwater. Additional surface area, similar in effect on groundwater to the existing fracture system, will be created by the drill holes in Alternatives One, Three, Four, and Five (Table 5.0-1).

TABLE 5.0-1

Increase in Fracture Surface Area

Exploration Area	Existing Fracture Surface Area (sq ft)	Increase in Surface Area (sq ft)	Percent Increase
A	7.7×10^9	2.4×10^4	0.0003%
B	8.7×10^9	1.6×10^4	0.0003%
C	8.0×10^9	1.8×10^4	0.0002%

Increases of such small magnitude do not represent a significant increase in available area for oxidation, solution, and mobilization of uranium in groundwater.

Alternative Two would result in no removal or relocation of rock and no increase in surface area for groundwater movement, but would also result in no gain of information. Alternatives One, Three, and Four will result in the environmental consequences outlined above. Alternative Four would provide more information on groundwater than Alternatives One and Three. Alternative Five, because of the greater number of drill holes, would result in slightly greater amounts of removed rock and slightly greater increase in surface area for groundwater movement, but would also result in a considerable increase in information.

Removal or relocation of rock and the slightly increased surface area for solution of uranium are the direct, unavoidable, and irreversible effects of the project.

5.5 SOILS

Alternative Two would have no effect on soils. For Alternatives One, Three, Four and Five, effects on soils will result from construction of pads and establishment of clearings for fire prevention.

These effects will consist of erosion, defined as on-site soil movement, and off-site sedimentation, defined as that fraction of erosion reaching a stream.

In order to determine project effects (Alternatives One, Three, Four, and Five), erosion and sedimentation were modelled using state-of-the-art procedures. Modelled erosion and sedimentation from the proposed project were added to normal erosion rates and to the increase above normal which is expected as a consequence of wildland fire.

Estimated erosion and sedimentation for each Exploration Area for each year of operations are estimated in Tables 5.0-2 and 5.0-3.

TABLE 5.0-2

Volume of Erosion (Cubic Yards)

Year of Operation	Exploration Area A			Exploration Area B			Exploration Area B		
	Norm.	Norm. & Fire Caused	Norm.& Project Caused	Norm.	Norm. & Fire Caused	Norm.& Project Caused	Norm.	Norm. & Fire Caused	Norm.& Project Caused
1	460	555	460.2	490	710	490.2	445	540	445.2
2	460	490	460.4	490	565	490.4	445	480	445.4
3	460	480	460.6	490	540	490.6	445	465	445.6
TOTAL	1380	1525	1381.2	1470	1815	1471.2	1335	1485	1336.2
% of Normal	100	111	100.1	100	123	100.08	100	111	100.1

TABLE 5.0-3

Volume of Sedimentation (Cubic Yards)

Year of Operation	Exploration Area A			Exploration Area B			Exploration Area B		
	Norm.	Norm. & Fire Caused	Norm.& Project Caused	Norm.	Norm. & Fire Caused	Norm.& Project Caused	Norm.	Norm. & Fire Caused	Norm.& Project Caused
1	65	80	65.02	235	345	235.02	60	90	60.02
2	65	70	65.04	235	275	235.04	60	70	60.04
3	65	65	65.06	235	260	235.06	60	65	60.06
TOTAL	195	215	195.12	705	880	705.12	180	225	180.12
% of Normal	100	110	100.06	100	125	100.02	100	125	100.07

Alternatives One and Three would cause small additional amounts of erosion and sedimentation. Alternative Two would allow continuation of normal and fire-caused erosion and sedimentation but no additional erosion would develop. Alternatives Four and Five would result in reduced erosion and sedimentation loads as a consequence of mitigation measures. These mitigation measures (see Appendix G) are "Best Management Practices" (USDA 1979) for all operations and for pad construction.

The slightly increased erosion and increased sedimentation load is an irretrievable effect, although the process of erosion is reversible using the mitigation measures outline in Alternatives Four and Five. Cumulative effects on soils will be very small for any alternative.

5.6 VEGETATION AND WILDLIFE

There would be no effects on wildlife with Alternative Two. The potential effects of Alternatives One, Three, Four, and Five on wildlife can be divided into three categories: those effects resulting from radioactivity, those associated with increased human activity during periods of exploration, and those drilling operations that result in habitat change.

There would be some radiological impacts on animals in the project area; however, because of the small amount of potentially radioactive material involved (refer to Table A.2, Appendix A) and its low uranium content (refer to Appendix A.3), the dose rates and doses to animals in the project area are expected to be very low. Moreover, since a very small proportion of the individuals in the project vicinity would likely be affected, the total impact on local biota would be very small. It is generally agreed that the limits established for human beings are also conservative for other species (U.S. Nuclear Regulatory Commission 1980a). Thus, following the guidance of the Nuclear Regulatory Commission (1980a), only radiation doses to humans are considered in detail in this environmental impact statement (refer to Section 5.7).

Habitat in the immediate vicinity of project operations will be avoided by most wildlife, including wild horses, when work is in progress. This is a short term effect that does not result in any long term loss of resource value. There will be no effects on threatened or endangered plant or wildlife species.

Drilling operations will change wildlife habitat because each drill site will need to be prepared for drilling operations. Drill sites located in brushy vegetation will be cleared by hand tools in a 10 foot (3m) radius area around each drill hole. This will result in an .016 acre (0.006 ha) clearing that will last from seven to ten years. In brushy areas these clearings will actually increase vegetative diversity resulting in improvement of wildlife habitat. Care will be taken to avoid removing any trees in brush clearing operations.

Where pad construction is necessary, some alteration of habitat will occur. Bulldozers will remove topsoil and leave a growing surface that is predominantly parent material. Although these pads will add some diversity to brushy areas, their value is greatly diminished by their lack of fertility. The individual and cumulative effect of these pads on wildlife habitat is not an important consequence of the proposal.

Introduction of small amounts of radionuclides into the food chain at locations of cuttings piles may result. In order to minimize such an effect, a program of cuttings management is incorporated in Alternative Four (refer to Appendix D).

Alternative Two will result in no disruption and no increase in wildlife habitat diversity. Alternatives One, Three, Four and Five will temporarily disturb wildlife in the vicinity of project operations. This effect will be transitory. A short term increase in vegetative diversity, with a corresponding small increase in wildlife habitat diversity, will result from clearing brushy vegetation from work areas.

Alternative Two will produce no increase of radionuclides in vegetation. Alternatives One and Three may cause an unacceptable increase in radionuclides in drillsite vegetation. Alternatives Four and Five would keep levels of radionuclides in on-site vegetation to acceptable levels by following remedial action guidelines for uranium mill tailings.

5.7 RADIATION EXPOSURE

Radiation exposure might result from radon emanation from drill holes and gamma radiation from cuttings. Since no milling, separation, or other processing of rock is proposed, the potential effects are limited to natural radiation potentially enhanced by project operations.

5.7.1 Radon Emanation from Drill Holes

The human population at any immediate risk from radon emanation consists of the project drillers and the project geologist. The mechanics of gas dispersion would dilute the small amounts of emanated radon to background levels at short distances from the source. The basic method for deriving estimated radon emanation is based on Evans (1980), Hersloff (1981), Fowler, et al (1981), and U.S. Environmental Protection Agency (1980a). Exposure of each driller to radon from all drill holes completed in one season of operation is 7.7×10^{-4} working level month for ore of typical grade (0.03 - 0.05% U_3O_8). Radon emanation from drill holes is not a serious hazard to worker health with Alternatives One, Three, Four, and Five. There would be no radon emanation from drill holes with Alternative Two.

5.7.2 Gamma Radiation from Cuttings

The principal population at risk from gamma ray exposure from cuttings from mineralized zones consists of the drillers and the project geologist. Forest visitors or other users of National Forest land, including Forest Service employees, are considered a secondary population at risk. Since gamma radiation is attenuated rapidly with distance from its source, no other human population is thought to be at risk. Calculated annual exposure of drillers to ore zone cuttings is 0.10 mrem in the typical case, 0.73 mrem in the worst case. The project geologist's annual exposure would be 0.30 mrem in the typical case and 2.23 mrem in the worst case. Exposure of a Forest user who would spend five percent of a year (438 hours) at approximately one meter from a cuttings pile would receive a dose equivalent to 0.24 mrem in the typical case and 17.5 mrem in the worst case.

Thus, gamma ray exposure would not exceed the occupational exposure guide (5.0 rem) even in the worst case. Gamma ray exposure to incidental Forest users is not significant. Continuous exposure in close proximity to mineralized cuttings would, even in the worst case, fail to exceed the guidance for total annual whole body dose equivalent.

The cuttings management plan (Alternatives Four and Five) will mitigate any adverse impacts of radioactive cuttings.

In order to minimize gamma radiation from cuttings and attendant radon flux, the cuttings management plan will adhere to interim Federal guidance for mill tailings. The interim standards require management of mill tailings which exceed 5 pCi/g of radium 226 (40 CFR 190).

5.8 SOCIAL AND ECONOMIC ENVIRONMENT

Evaluation of the socioeconomic effects of the project centered on the local residents of the Navajo area. The scope of the project is so small and the duration so short as to have no socio-economic effect on a larger area. Previous exploration drilling in the area has produced no discernible social or economic effects locally or regionally and it is unlikely that additional work will cause any significant effects.

Alternative Two would directly forego opportunities for future employment in potential future mineral development but would otherwise continue the existing employment situation. Loss of opportunities to tax the possessary right attached to unpatented mining claims will also be foregone, as well as the benefits of additional geological, hydrological, and mineralogical information. Alternative Two would not have any other social or economic impacts. Alternatives One, Three, Four, and Five have the possibility of slightly increasing emigration from the Red Wind community. The project proposal has caused controversy among some members of local and regional population. Among local residents opposed to the project, there is likely to be some fear and a sense of loss of control over events. There is the possibility of some interference with the religious practices of the Red Wind community through project noise, proximity of work to places of importance to religious practice, and a perceived sense of insult to sacred attributes imputed to the natural environment. However, since no relevant facts on specific religious practices were provided to the Forest Service, the project impacts on such practice cannot be assessed in detail. Identified sites of religious value will be avoided by project operations in Alternatives Four and Five.

There will be no effect on the economic base of the area nor on social institutions. Since the project is of short duration, it is anticipated that no cumulative social or economic impacts will result. Any restrictions on outdoor recreation opportunities of local residents will be of short duration and minimal in scope.

Geologic, mineralogic, and geohydrologic data resulting from Alternatives One, Three, Four, and Five can produce local and regional benefits, including planning data for water use and identification of drinking water quality problems requiring corrective action.

5.9 RECREATION

Alternatives One, Three, Four, and Five may have an effect on recreation because of the presence of machinery, activity, and project noise. However, the project would take place during the summer, the period of least recreational use of the area.

Motorcycle use is infrequent in the area during the summer. However, the few motorcyclists who use the area during the period of project operations may find their progress on off-road vehicle (ORV) routes temporarily impeded by the presence of machinery on or adjacent to such routes. Project noise should not affect motorcyclists since a quiet recreation experience is not thought to be an objective of this class of activity.

Deer hunting will probably be affected by project activity and noise. Since deer hunting season and the proposed schedule for operations would coincide, the effect on deer hunting is thought to be locally significant. This effect will result in decreased hunter success ratios during the seasons of operation, an irretrievable loss. However, since this loss will be restricted to the three seasons of operations, it would not constitute an irreversible loss of future hunting success. Because of the somewhat greater duration of operations in Alternative Four, these effects would last longer than they would under Alternative One or Three. Alternative Five would result in the effects described above but the effects would last longer. The project should have no effect on recreational gold-seeking with Alternatives One, Three, Four, and Five. Alternative Two will result in elimination of recreational gold panning.

The effect of the project on recreation will be short term and direct. No cumulative impacts on recreation are expected from any of the alternatives.

5.10 BLACK MOUNTAIN FURTHER PLANNING AREA

Exploration Area A is located within the Black Mountain Further Planning Area (see Section 4.11). Withdrawal of the area from mineral entry (Alternative Two) would not have any effect on the area's Further Planning Area status. Exploration (Alternatives One, Three, Four, and Five) would not remove the area from Further Planning Area status nor would exploration exclude the area from wilderness designation in the future, since activities permitted by prior rights, existing law, and other established uses may continue pending final disposition of the RARE II areas (U.S. Forest Service 1979).

Mineral exploration (Alternatives One, Three, Four, and Five) would have the following effect on the wilderness attributes for the area:

- Natural integrity would be slightly impaired in the 108 acres (44 ha) of Exploration Area A where activities such as vegetation clearing, drilling, and pad construction take place
- Apparent naturalness would be disturbed in small areas for a short time (until the vegetation returns) since human activity would be apparent to Forest visitors
- Apparent solitude would remain low
- Opportunities for primitive recreation would remain low
- The sensitive plant species in the RARE II area would not be disturbed and the wild horse herd would be temporarily disturbed during actual operations.

5.11 VISUAL RESOURCES

Alternative Two would result in no change in existing visual quality. The project elements would result in impacts on visual resources within the project vicinity. These impacts consist primarily of short-term, reversible alterations of natural character and overall scenic quality.

These effects are the result of

- changes to vegetation and topography
- intrusion of project-related equipment, vehicles, and debris.

Changes in vegetation and topography will result from clearing grass and brush from drill sites for fire hazard reduction, from crushing of vegetation by overland movement of drilling equipment, and from drill pad construction. These changes are viewed as cumulative since they are added to existing changes in visual quality.

Visual impacts limited to the duration of project operations include presence of equipment, vehicles, and sanitary facilities, and generation of dust from drilling and traffic.

Alternatives One, Three, Four, and Five will result in effects from the project elements summarized

above. Under Alternatives One and Three, clearing of vegetation may be noticeable but not likely to attract attention in Areas A, B, and C. Pad construction in Areas A and C and portions of Area B may be noticeable but should not attract attention. In Areas A and C, changes from vegetation crushing and the presence of vehicles and equipment will attract some attention while debris disposal should not. In portions of Area B with low absorptive capability, pad construction, and debris disposal will attract attention while vegetation crushing and parked vehicles will be seen as obvious changes.

Mandatory and recommended mitigation measures (Alternatives Four and Five) can reduce these visual impacts. Mandatory actions include provisions for pad construction, vegetative clearing, drill site abandonment, and trash and debris disposal. Actions recommended where consistent with exploration objectives include provisions for siting drill holes to minimize visual impacts.

Alternatives Four and Five would incorporate such measures. Reduction of impacts would be achieved in the visual intrusion of clearings, pads, trash, and brushy debris. No mitigation of the visual impacts of brush crushing or of parked vehicles and equipment would be achieved. Rehabilitation activities upon termination of the project have the potential for improving visual condition especially in previously disturbed areas. Since Alternative Five provides for one additional year of drilling, it would have slightly greater impacts than Alternative Four.

5.12 ARCHEOLOGICAL AND HISTORICAL VALUES

Alternative Two would have no effect on archaeological and historical values. Project elements of Alternatives One, Three, Four and Five have the potential to directly disturb archeological and historical values. These elements are

- vegetation clearing from drilling sites
- drilling operations
- off-road movement of machinery.

No indirect disturbance of archeological and historical values is expected since these project elements are substantially site specific. However, all damage to such resources constitutes both an irretrievable and irreversible loss. Cumulative impact would accrue to the identified prehistoric archeological site from the combined effects of project elements and effects from an unofficial trail which crosses the site.

Impacts from project elements can be averted by incorporating a program of site avoidance into the conditions of approval (Alternatives Four and Five). Such a program incorporated into Alternatives Four and Five would result in no impact to cultural resources.

5.13 NOISE EXPOSURE

Alternative Two will result in no change to ambient noise levels. Noise levels will be temporarily elevated during project operations. Elevated noise will primarily result from operation of the drilling equipment and secondarily from a generator or a compressor. Intermittent, mobile noise will result from vehicle traffic and movement of project equipment among drillsites, but this mobile noise is not thought to contribute significantly to overall noise levels.

The drilling equipment will not exceed 101 dB(A) at 50 ft. Typically the noise from the drill will be an impulsive sound rather than continuous noise. Noise between impulses will be controlled by the noise level of the compressor (approximately 81 dB(A) at 50 ft). However, since drill rig noise will exceed other sources by more than 10 dB, there is no need to develop a composite, or cumulative, level of total noise exposure (Swing 1975). Since operations would be restricted to daytime hours, the A-weighted sound level will be equivalent to the day-night average level (L_{dn}) used in estimating noise compatibility.

Typical and worst case intrusive noise levels were estimated for five receptor sites: three sites are single residences or clusters of residences; two sites are identified locations of religious practice. Figure 5.0-1 depicts the locations of the residences, but the sites of religious practice are not shown in order to protect confidentiality.

Intrusive noise estimates were developed for the five receptor sites by projecting noise contours along the shortest line between the proximal boundary of each Exploration Area and each receptor site. These contours were based on the general rule that unobstructed noise will attenuate at fixed decrements for every doubling of distance beyond 100 feet. The typical case is based on an attenuation rate for impulsive noise of 7.0 dB(A) (Gill 1981). The typical case could be exceeded infrequently but would not exceed the worst case estimate. Since topographic and other obstructions to noise are present between many of the potential drill sites and the receptor sites, both the typical case and the worst case estimates will be conservative. Tables 5.0-4 and 5.0-5 summarize the results of the estimation of noise exposure.

TABLE 5.0-4

Typical Case Noise Levels at Receptor Sites

Project Noise from Exploration Areas dB(A)

Receptor Site	Area A	Area B	Area C
One	44.5	79.5-65.5	58.5-51.5
Two	58.5	51.5-44.5	<44
Three	58.5-51.5	44.5-37.5	<44
Four	58.5	44.5	<44
Five	44.5	44.5	58.5

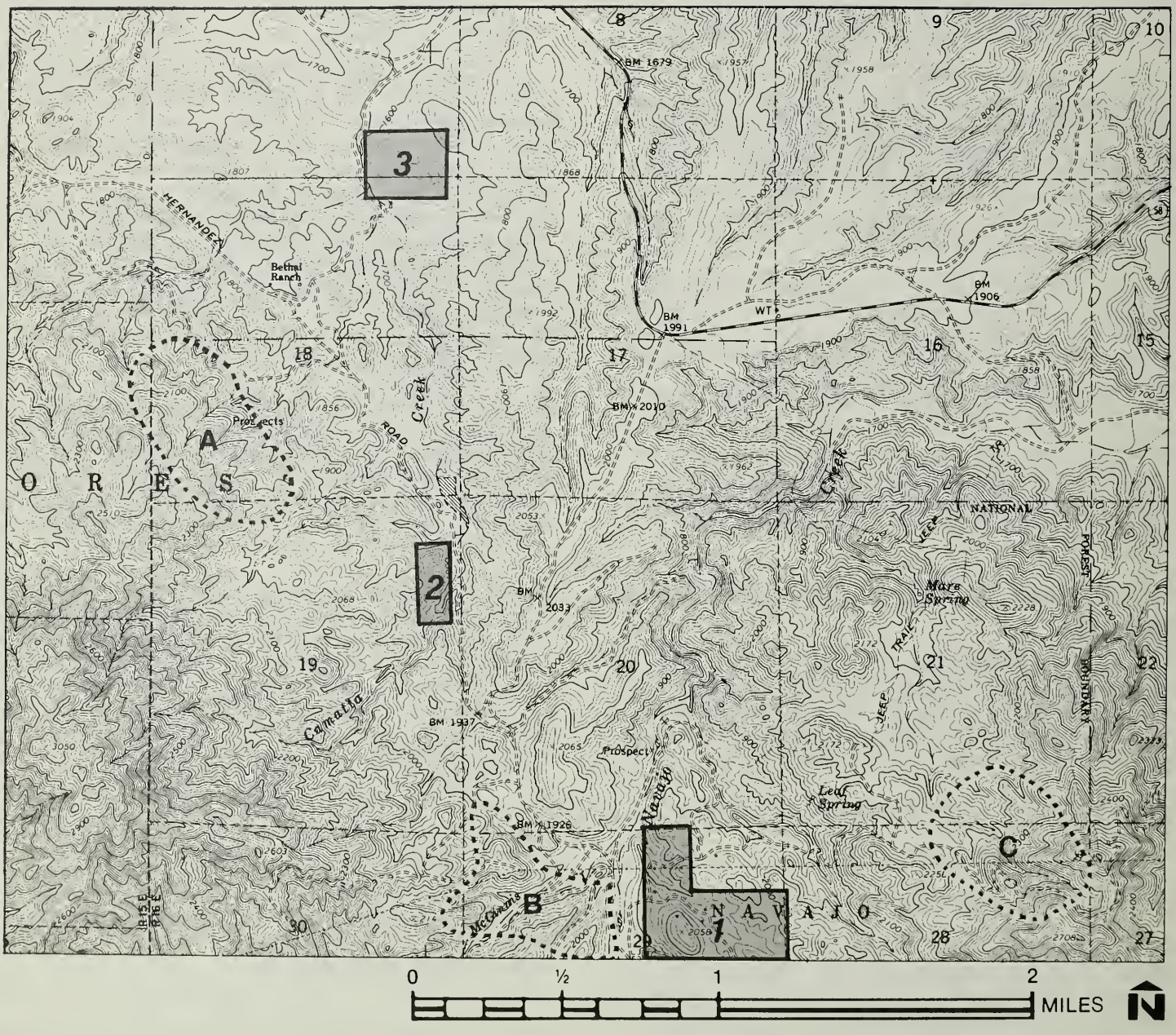


Figure 5.0-1 Noise Receptor Site

TABLE 5.0-5

Worst Case Noise Levels at Receptor Sites

Project Noise from Exploration Areas dB(A)

Receptor Site	Area A	Area B	Area C
One	<64.0	87.0-78.0	73.5-69.0
Two	73.5	69.0-64.5	<64.0
Three	73.5-69.0	64.5-60.0	<64.0
Four	73.5	64.5	<64.0
Five	64.5	64.5	73.5

The "normally acceptable" noise compatibility guideline for residences (55-59 [L_{dn}] as noted in the San Luis Obispo County Noise Element (1976) will be exceeded at Receptor Site One by operations at Exploration Area B. Normally acceptable levels will be exceeded five days during the first year of operations and seven and one-half days each for the second and third years of operation.

The nuisance effect of this work can be mitigated by reducing the hours of work at Exploration Area B. Restriction of operating hours to 0800 to 1730 weekdays and 0900 to 1730 on Saturday should sufficiently reduce the nuisance. Reduction of hours will result in slightly longer periods of operation at Area B for each of the three seasons of work. Year One would require approximately one and one-half additional days; Years Two and Three would require an additional two and one-half days.

Alternatives One and Three would result in the noise levels described above. Alternative Two would result in no intrusive noise. Alternatives Four and Five would reduce the nuisance value of noise at Receptor Site One but would result in a slightly longer duration of operations at Exploration Area B.

The noise effects described above will be direct effects from the project. Effects will be short term; noise will begin with the onset of the project and continue for the duration. If the project is implemented, the effects of noise are unavoidable but not cumulative.

5.14 WILDLAND FIRE

Alternative Two will have no change on the existing wildfire situation.

Elements of the proposed project (Alternatives One, Three, Four, and Five) will increase the danger of accidental wildfire. This increase in danger results from the presence of workers and machinery near flammable vegetation during the season of peak fire danger. This work may result in ignition from sparks or flame from vehicle and equipment operation, smoking, or welding.

A fire prevention plan would be developed (Alternatives Four and Five) to apply to all operations of the Lomex Corporation in order to minimize the possibility of accidental fire. The Lomex Corporation will be required to hand clear or reduce grass and brushy vegetation around the drill sites. This clearing should minimize the danger of accidental ignition. These clearings will result in establishment of a "mosaic" of uneven-age vegetation. Such a mosaic is a benefit since it reduces the ability of a given area to sustain wildfire.

5.15 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

There would be short term local effects on air quality from dust and fumes caused by vehicles, drilling fines, and equipment. Removal of ground water would be an unavoidable, short term, and irretrievable consequence of the project, but ground water will be recharged from precipitation. Without the mitigation measures specified in Alternatives Four and Five, there is the potential for long term effects from the mixing of deleterious surface runoff with ground water. If mixing occurred, there would be an irretrievable loss to local users. Without the mitigation measures specified in Alternatives Four and Five, ground water contamination could occur from the existing drill holes and the proposed drill holes; this would be a cumulative effect. In the unlikely event more than one aquifer exists, there would be the possibility of interaquifer exchange of contaminated water with good water; such exchange would be a direct, long term, cumulative and adverse impact of the project. Ground water pumping could cause a short term effect on stream water quality by mixing deleterious water with good water in stream channels; the mitigation measures for Alternatives Four and Five could reduce such impact. Cuttings which are not managed (Alternatives One and Three) could cause a direct, long term change in water quality and would be cumulative with cuttings from past work. The mitigation measures in Alternatives Four and Five would reduce or eliminate impacts from cuttings.

Information on the geology and mineralization of the area could lead to further exploration or development. There would be a direct, unavoidable, irreversible and cumulative impact from the removal of rock and other material. The mitigation measures in Alternatives Four and Five would reduce erosion and sedimentation loads that would occur without the measures; any effects would be irretrievable and cumulative. Effects on vegetation would be direct and short term since vegetation will return. Some wildlife individuals would be temporarily displaced during operations. Radon emanation from the Exploration Areas would be slightly increased for a very short time. Mitigation measures (for Alternatives Four and Five) would reduce the potential exposure to gamma radiation and radon flux from cuttings and would mitigate adverse impacts.

There would be no effect on the economic base of the area or on social institutions. Any restrictions on outdoor recreation opportunities will be of short duration. The effect on religious practices cannot

be assessed in detail since information was not provided. For Alternatives Four and Five, identified sites of religious value will be avoided by project operations. Although there could be some impacts on surface resources, the status of the Black Mountain RARE II Further Planning Area will not be affected by the project since mineral exploration is permitted in RARE II areas.

If mitigation measures are used (Alternatives Four and Five), most visual impacts will be short term; however, changes in vegetation from drill pad construction and equipment movement would be cumulative. Rehabilitation measures would have the potential to improve visual quality. Increased noise will be a direct, unavoidable, and short term consequence of the project.

6.0 LIST OF PREPARERS

6.1 CHIEF PREPARERS

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Huaute, Semu - Chumash Spiritual Leader

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6.3 CONTACTS

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Miller, Robert - U. S. Bureau of Mines

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Rebuffoni, Dean - Staff Writer, Minneapolis Tribune

Reighardt, Ken - Consulting Engineer

Sager, Joel - Red Wind Foundation

Scarano, Ross - Chief, Uranium Recovery Licensing Branch, Nuclear Regulatory Commission

Smidley, Frank - Lands Officer, Black Hills National Forest

Smith, Wilber - Association of Monterey Bay Area Governments

Stieff, Loren - President, Stieff Research and Development

Tisdel, Larry - Research Institute, Colorado School of Mines

Urband, H. T. - Engineer, E.D.A., Inc.

Willard, Al - California State Lands Commission

Wraxwieler, Richard - Department of Health and Welfare, NIOSH

Appendix A

LOMEX CORPORATION'S PROPOSED PLAN OF OPERATIONS AND SUPPLEMENTARY TECHNICAL INFORMATION (ALTERNATIVE THREE)

A1.0 Correspondence from the Lomex Corporation

A2.0 Drill Hole Engineering

A3.0 Drilling and Sampling Procedures

A4.0 Management of Cuttings

A5.0 Facilities, Equipment, and Personnel

A6.0 Duration and Schedule of Operations

A7.0 Transportation

APR 4 1980

March 31, 1980

Keith Gunther, District Ranger
Los Padres National Forest
1616 Carlotti
Santa Maria, California 93454

Dear Mr. Gunther:

Submitted herewith is a "plan of operations" for the construction of an access road and drilling activities on unpatented mining claims held by the Lomex Corporation in sections 18 and 19, T.29S., R. 16 E., M.D. B.M. The proposed road would be designed for four wheel drive use with a single lane width and channel grade creek crossings. Dry weather access only is assumed although an attempt will be made to hold grades under fifteen percent to permit later improvement for all weather use if required later.

The purpose of the road is to provide access for track and truck mounted drilling equipment and related support vehicles. In addition the road will enable entrances to claims for surveyors, engineers, geologists, etc. conducting normal exploration activities. The road will be wholly within unpatented claim boundaries now held or in the process of being staked by Lomex.

The proposed alignment will utilize approximately 7200 feet of existing dozer trail which would be upgraded primarily by the clearing of overhanging brush. New construction would total approximately 5400 feet.

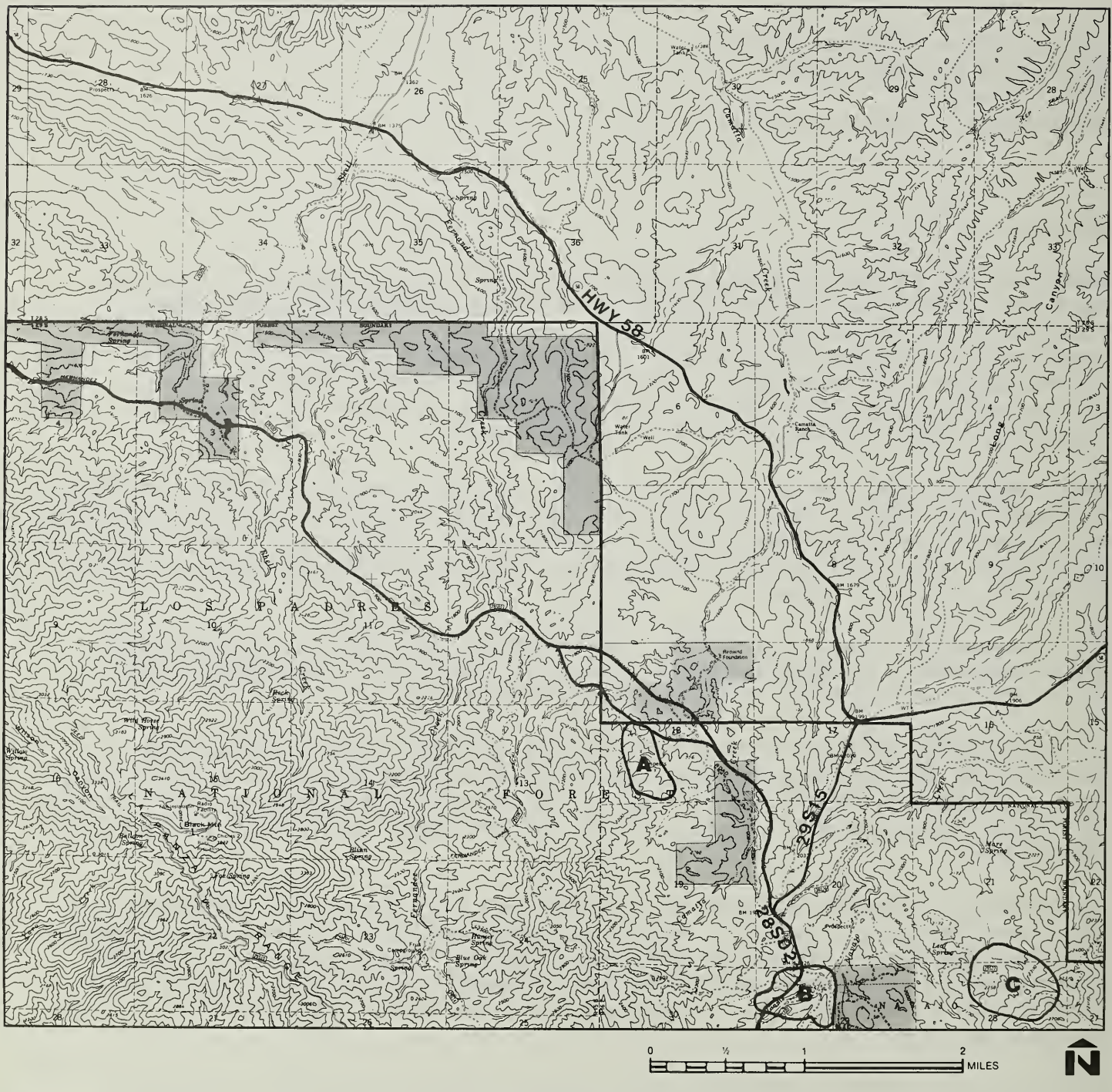
The approximate location of drilling activity proposed for the 1980 season is shown on the attached map and would be restricted primarily to the road alignment in the SW¼ of Sec. 18 and NE½ of Sec. 19. Holes would be drilled by track mounted air hammer type equipment, cased with 1½" PVC and capped at least 6 inches below road grade.

To summarize, a permit for road construction and drilling work is requested by the Lomex Corporation to enable access to unpatented mining claims for the purpose of conducting annual assessment work and associated exploration. It is noted that previously available access via the Fernandez road has been interrupted by the Red Wind Foundation where it crosses their fee land in the SE¼, SE¼, Sec. 18, T. 29S., R. 16 E.

Action on this proposal would be appreciated as soon as possible to permit a minimum 90 days of operations prior to the August 31st anniversary date for assessment work.

Sincerely,

Richard J. Rongey
Vice President
Lomex Corporation



Private Property

Approximate Boundary of Exploration Areas

LOMEX CORPORATION
901 N. CARANCAHUA - SUITE 709
CORPUS CHRISTI, TEXAS 78401
(512) 884-5841

R.J. RONGEY - GEOLOGY
W.A. ARMSTRONG - LAND

MAY 12 1980

May 9, 1980

Keith Guenther, District Ranger
U.S. Forest Service
Santa Maria Ranger District
1616 Carlotti
Santa Maria, CA 93454

Dear Mr. Guenther:

Submitted herewith is the requested additional information concerning the Lomex 3-31-80 operating plan submittal.

1. Width of road needed:

   A single lane, one blade width cat trail type road is proposed. Widths will prabably vary between 10 and 14 feet depending on terrain.

2. Field flagged location:

   A field flagged alignment will be completed by approximately 5-22-80.

3. Cross Sections:

   These will be submitted for individual locations as requested after your field inspection of the alignment.

4. Dozer Trails:

   These will be flagged as requested.

5. Core Samples:

   Air hammer drills will be used. Cutting samples will be collected and bagged.

6. Recovery methods:

   The operating plan is for exploration only. No particular mining method can be or will be proposed pending the discovery of economic mineralization.

NEW YORK OFFICE: 122 EAST FORTY SECOND STREET - SUITE 4907 • NEW YORK, N.Y. 10017 • (212) 697-3390

7. Traffic Volume:

During the period of drilling exploration traffic would involve several pickup truck passes each day. Post drilling work would be limited to the occasional movements of Geologists or claim staking crews.

8. Hole Completion:

Holes will be cased with PVC buried 8" - 12" below road grade, capped by a steel plate under soil cover.

9. Surface Radiation:

Areas to be drilled have naturally high surface radiation rates. No detectable increase in this rate would be anticipated as a result of drilling operations.

Ground water quality:

At locations of uranium mineralization ground water quality is naturally unsuitable for use. No change in character is anticipated due to drilling operations.

10. Archeaological resources:

None are known to be present.

Endangered plant and wildlife:

None are known to occur.

Note: This area was totally burned over during the Fall of 1979.

Regarding a field meeting, I plan to be on the project between the 19th and 23rd of May. The afternoon of the 22nd would be most convenient for a field meeting.

Sincerely,

Richard J. Rongey
Project Geologist

RJR/ce

LOMEX CORPORATION
901 N. CARANCAHUA - SUITE 709
CORPUS CHRISTI, TEXAS 78401
(512) 884-5841

R.J. RONGEY GEOLOGY
W.A. ARMSTRONG - LAND

JUN 19 1980

June 16, 1980

Mr. Keith Gunther, District Ranger
Los Padres National Forest
1616 Carlotti
Santa Maria, California 93454

Dear Mr. Gunther:

The plan of operations as submitted 3/31/80 is herewith amended to revise and include additional areas for drilling exploration and revise location of road access.

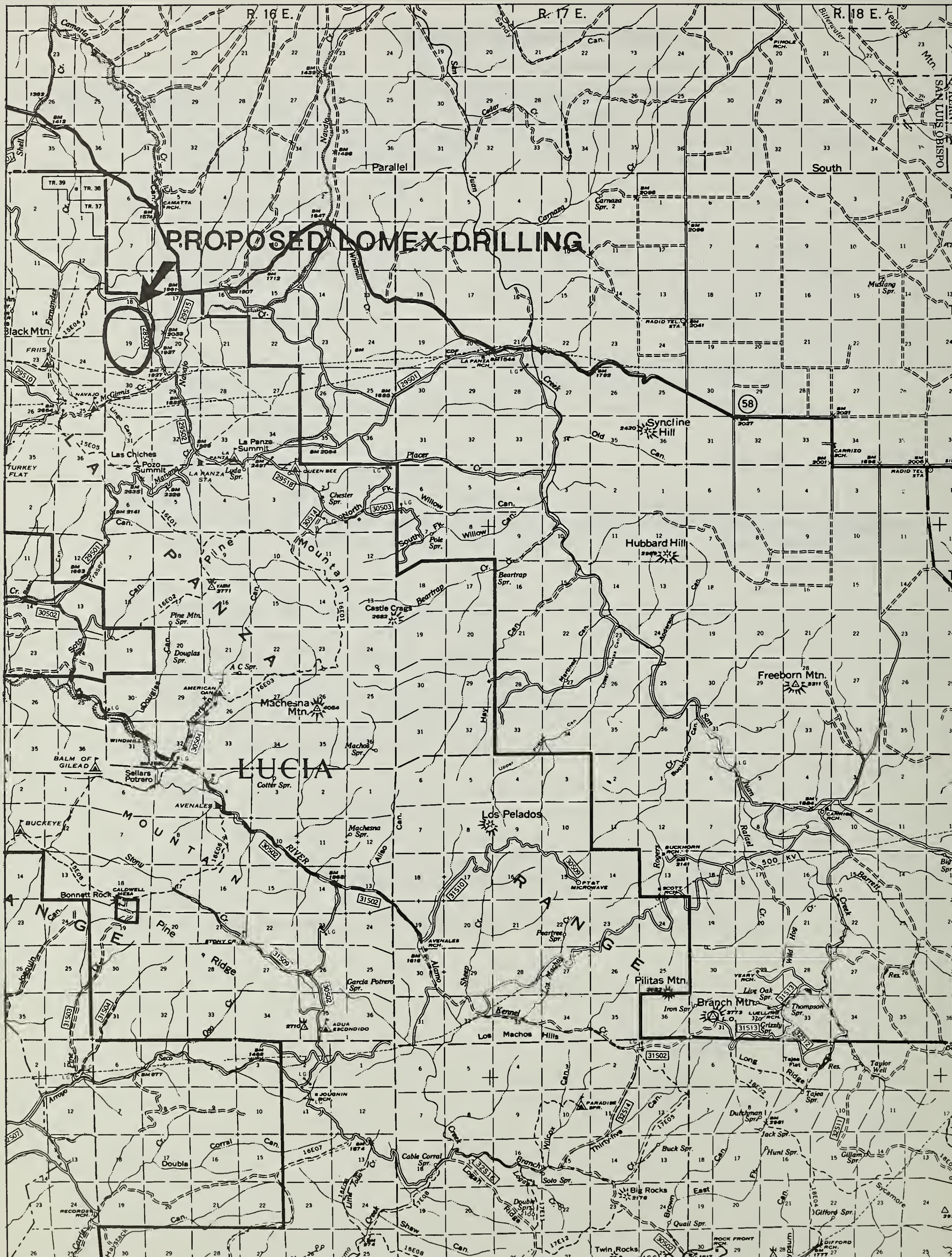
As shown on the attached map the proposed road is now positioned through the NW¼ of Section 20, SW¼ of Section 17 and intersects the existing Fernandez road in the SE¼ of Section 18, all in 29S., R. 16 E., MDBM. The existing road to the site proposed for drilling exploration in Section 18 (see map) would be upgraded for 4 wheel drive access. Road access into, and for drilling exploration along the South line of Section 18 and within Section 19 are withdrawn from this current plan.

Additional areas proposed for drilling include 10± holes along existing roads on the Navajo prospect in the NW¼ of Section 29 and 15± holes along the existing road near the North line of Section 28 (see map).

The purpose and period of use are as originally proposed.

Sincerely,

Richard J. Rongey
Vice President
Lomex Corporation



R. 16 E.
R. 17 E.
R. 18 E.
PROPOSED LOMEX DRILLING
KERN
SAN LUIS OBISPO
Parallel
South
Black Mtn.
FRIIS
Camatta
CAMATTA RCH.
Navajo
Cedar Cr.
Carnaza Spr.
Windmill
Mustang Spr.
RADIO TEL. STA.
LA PANZA RCH.
Syncline Hill
Old Can.
CARRIZO RCH.
McGinnis
NAVAJO
La Panza Summit
Las Chiches
Pozo Summit
LA PANZA STA
Luda Spr.
QUEEN BEE
Chester Spr.
Placer Cr.
Willow Can.
Pole Spr.
Hubbard Hill
TURKEY FLAT
Pine Mountain
Castle Crags
Beartrap Spr.
Pine Mtn. Spr.
Douglas Spr.
A C Spr.
AMERICAN CANYON
Machesna Mtn.
Freeborn Mtn.
Anderson
Machos Spr.
BALM OF GILEAD
Sellars Potrero
WINDMILL
LUCIA
Cotter Spr.
AVENALES
BUCKEYE
MOUNTAIN
RIVER
Machesna Spr.
Los Pelados
RANGE
CARRISA RCH.
BUCKHORN RCH.
Rogers
Rafael
500 KV
SCOTT RCH.
AT&T MICROWAVE
Bonnett Rock
CALDWELL MESA
Stony
Pine Ridge
STONY CR.
AVENALES RCH.
Alamo
Sheep Cr.
Peartree Spr.
Garcia Potrero Spr.
Pilitas Mtn.
Branch Mtn.
Iron Spr.
Live Oak Spr.
Thompson Spr.
Grizzly Spr.
YEARY RCH.
LUELLING RCH.
Barrett
Wild Hog Cr.
Res.
AGUA ESCONDIDO
Kennel
Los Machos Hills
Seco
Arroyo
Long Ridge
Tajea Flat
Taylor Well
Tajea Spr.
PARADISE SPR.
JOUGNIN RCH.
Dutchman Spr.
Jack Spr.
Hunt Spr.
Gillam Spr.
Corral Can.
Doubla
Cable Corral Spr.
Branch
Soto Spr.
Wilcox
Thirty-five
Buck Spr.
Big Rocks
East
RECORDS RCH.
Logan
Double Spr.
Ridge
Brown
Quail Spr.
Gifford Spr.
Sycamore
Haystack
Shaw
Twin Rocks
ROCK FRONT RCH.
Gypsum
GIFFORD RCH.
Lime Tule

LOMEX CORPORATION
710 BUFFALO — NO. 14 SUITE 201
CORPUS CHRISTI, TEXAS 78401
(512) 884-5841

November 4, 1981

Mr. Keith Gunther, District Ranger
Los Padres National Forest
1616 Carlotti
Santa Maria, California 93454

Dear Mr. Gunther:

Notice is herewith given that the Lomex Corporation wishes to modify the "Plan of Operations" as submitted March 31, 1980 covering proposed exploration in T. 29S., R. 16E., M.D.B.M.

This modification involves the proposed access roads to bypass Redwind Foundation property in the SE¼, SE¼, Sec. 18. Agreements for alternate access have been obtained.

Sincerely,

Richard J. Rongey, Vice President

RR:ce

NEW YORK OFFICE: 380 LEXINGTON AVE. - SUITE 4907 • NEW YORK, N.Y. 10017 • (212) 697-3390

A2.0 DRILL HOLE ENGINEERING

It has been proposed to drill a maximum of 145 drill holes. The holes would be drilled to a maximum 250 feet (76m). Hole diameter will be approximately three inches (7.6 cm). Holes would be cased. Casing would have the following specifications:

Type:	Polyvinyl chloride (PVC), Schedule 40, bell-end pipe
Fittings:	Cemented bell-joints
Diameter:	2.5 inches (6.4 cm)
Wall Thickness:	0.25 inch (0.6 cm)

The well casings would be assembled at the drill site, section-by-section and inserted into the drill hole. The casings would be capped with PVC well casing about 12 in (30 cm) below the surface. The typical drill hole would be capped after completion and would be open approximately six to eight hours. A thick steel plate (12 sq in x 0.5 in; 30 sq cm x 1.3 cm) would be placed over the well cap and covered with earth. The steel plate provides physical protection of the well and enables the wellsite to be precisely relocated with a metal detector or a fluxgate or proton precession magnetometer.

The drill rig assembly would move directly over the vegetation to the drill sites, thus obviating the necessity of graded access ways. At each drill site, vegetation would be cleared by hand tools for ten feet around the drill hole and equipment (approximately 700 sq ft [65 sq m]). Such clearings are not drilling pads. Pads would not be necessary at most drilling sites. However, drilling at the maximum slope for safe operation (35%) would require pad construction in addition to vegetation clearing. Although the Lomex Corporation intends to avoid operations on such slopes, they estimate that one pad per Exploration Area per year might typically be expected. The Forest Service estimates, in the worst case, that two pads per year per Exploration Area would be developed. Such pads would have dimensions of 6 ft (1.8 m) by 18 ft (5.5 m) and have an area of 108 sq ft (9.9 sq m).

A2.1 Exploration Area A

Thirty drill holes would be undertaken during the first year of work. Subject to findings of the drill holes, up to 30 additional holes could be drilled during two subsequent years. (approximately 15 each year). A total of 60 core holes could be drilled in Area A which is approximately 108 acres (44 ha) in area.

A2.2 Exploration Area B

Ten drill holes would be undertaken during the first year. Subject to findings of these drill holes, up to 30 additional holes could be drilled during two subsequent years (approximately 15 each year). A total of 40 holes could be drilled in Area B which is approximately 125 acres (51 ha) in area.

A2.3 Exploration Area C

During the first year of work fifteen drill holes would be undertaken. Subject to findings of the first year program, up to 30 additional holes could be drilled during two subsequent years (approximately 15 each year). A total of 45 holes could be undertaken in Area C which is approximately 118 acres (48 ha) in size.

A3.0 DRILLING AND SAMPLING PROCEDURES

Drilling would be done with a pneumatic, downhole air hammer, mounted on a track vehicle. Penetration rate is approximately 0.25m (3.3 ft) per minute. A stream of compressed air is injected into the well to cool the bit and to remove cuttings. Water is injected into the air stream to control dust and fines when drilling above the water table. Small amounts of a nontoxic, commercial detergent product are metered into the air stream when drilling in the water table. The resulting foam cleans the hole, brings cuttings to the surface, and prevents excessive groundwater influx. Abatement of airborne dry cuttings (from drilling above the water table) would be achieved by use of a horizontal steel baffle situated approximately 18 in (46 cm) above the drill hole. Particles ejected from the hole strike the baffle and collect around the hole. Fines and dust are expected to be minimal (refer to Section 5.2).

The volume of cuttings from a typical hole is expected to be 0.5 cu yd (0.3 Cu m). Table A.1 summarizes the expected volume of cuttings from each Area per year.

TABLE A.1 Cuttings Volume

	YEAR 1		YEAR 2		YEAR 3		TOTALS	
	cu yd	cu m	cu yd	cu m	cu yd	cu m	cu yd	cu m
Area A	13.7	10.5	6.7	5.3	6.7	5.3	27.1	21.1
Area B	4.6	3.5	6.7	5.3	6.7	5.3	18.0	14.1
Area C	6.8	5.2	6.7	5.3	6.7	5.3	20.2	15.8
TOTALS	25.1	19.2	20.1	15.9	20.1	15.9	65.3	51.0

TABLE A.2

Cuttings Volume from Mineralized Zone

	YEAR 1		YEAR 2		YEAR 3		TOTALS	
	cu yd	cu m	cu yd	cu m	cu yd	cu m	cu yd	cu m
Area A	0.8	0.6	0.4	0.3	0.4	0.3	1.6	1.2
Area B	0.3	0.2	0.4	0.3	0.4	0.3	1.1	0.8
Area C	0.4	0.3	0.4	0.3	0.4	0.3	1.2	0.9
TOTALS	1.5	1.1	1.2	0.9	1.2	0.9	3.9	2.9

Mineralized zone cuttings from the typical drill holes are expected to have an approximate volume of 0.7 cu ft (0.02 cu m). Volumes of mineralized zone cuttings (0.03 +- 0.05% U_3O_8 in the typical case and 0.3% U_3O_8 in the worst case) from each Area per year are shown in Table A.2.

Physical sampling of cuttings would be done at approximately 10 ft (3m) intervals. Samples would be collected by troweling between 18 to 36 oz (avoir.) (500 to 1000g) of cuttings into sealable, heavy plastic bags. Approximate total volume and weight of samples from a typical drill hole are 0.3 cu ft (0.008 cu m) and 55 lbs (25 kg), respectively. Approximate total volume and weight of samples from the typical 15 ft (4.6 m) thick mineralized zone are 0.028 cu ft (793 cu cm and 4.7 lbs (2.1 kg), respectively. Tables A.3 to A.5 summarize the total volume and mass of samples to be collected.

TABLE A.3

Total Volume of Samples Per Area Per Year

	YEAR 1		YEAR 2		YEAR 3		TOTALS	
	cu ft	cu m	cu ft	cu m	cu ft	cu m	cu ft	cu m
Area A	9.9	0.27	4.6	0.14	4.6	0.14	19.1	0.55
Area B	3.3	0.09	4.6	0.14	4.6	0.14	12.5	0.37
Area C	4.6	0.14	4.6	0.14	4.6	0.14	13.8	0.42
TOTALS	17.8	0.5	13.8	0.42	13.8	0.42	45.4	1.34

TABLE A.4

Total Volume of Mineralized Zone Samples Per Area Per Year

	YEAR 1		YEAR 2		YEAR 3		TOTALS	
	cu yd	cu m	cu yd	cu m	cu yd	cu m	cu yd	cu m
Area A	0.9	0.7	0.5	0.3	0.5	0.3	1.9	1.3
Area B	0.3	0.3	0.5	0.3	0.5	0.3	1.3	0.9
Area C	0.5	0.4	1.5	1.2	0.5	0.3	2.5	1.9
TOTALS	1.7	1.4	2.5	1.8	1.5	0.9	5.7	4.1

TABLE A.5

	Mass of Samples Per Year	
	All Samples	Mineralized Zone Samples
Year 1	1400 kg	120 kg
Year 2	1100 kg	95 kg
Year 3	1100 kg	95 kg
TOTALS	3600 kg	310 kg

The samples would be transported from the project area in a Lomex Corporation survey vehicle. In addition to the sampling, each well will be logged with a downhole radiation detecting instrument. Subsequent to completion of the drilling program, an ongoing program of periodic testing to ascertain variability of levels of activity in selected wells would be undertaken.

A4.0 CUTTINGS MANAGEMENT

No management of cuttings would be done.

A5.0 FACILITIES, EQUIPMENT AND PERSONNEL

Facilities and equipment include vehicles, power source, drilling equipment, and earth moving equipment. Vehicles to be used include:

- geological survey vehicle (pickup truck with enclosed bed)
- fuel tanker and water tanker, approximate capacity 2000 gal (7500 l).

The proposed power source is a 1200 cfm (34 cu m/min) wheel-mounted, rotary type compressor (Gardner-Denver or equivalent).

Drilling equipment would be a track-mounted (crawler), self-propelled downhole air hammer (percussion) drill with a maximum drilling depth capabililty of 250 ft (76 m).

A bulldozer (D-6 or equivalent) would be available to develop pads, if necessary, and to move the compressor to steep drill sites.

Personnel attached to the project would include the project geologist, a driller, an assistant driller, and a caterpillar tractor operator, when appropriate. The drillers and geologist would be equipped with hard hats, hard-toe shoes, and respirator masks designed for removal of dust.

A6.0 DURATION AND SCHEDULE OF OPERATIONS

Exploratory drilling operations would be underway six days each week (Monday-Saturday). The duration of each work day would be 12 hours. During each work day an average of two drill holes can be completed.

The proposed program of exploration drilling would take place during approximately one summer month for each of three consecutive years. The number of drill holes per Exploration Area per year and the expected number of days required to complete the program are shown in Table A.6.

Thus, operations proposed for each year could be completed in one month or less.

A schedule of the proposed operations would depend on an approval date of the Plan of Operations.

A7.0 TRANSPORTATION

Transportation will be required for personnel and equipment. Drilling personnel and supervisory personnel will commute daily from local residences or lodgings to the job site. A maximum of eight round trips to the job site are expected each work day. The fuel tanker would make one round trip every two weeks during operations. Projected total number of trips required to complete operations for each Exploration Area for each year and for the entire project are below (Table A.7).
Samples of cuttings will be taken from the area by a pickup truck or similar vehicle. The greatest level of ore activity known for the area is 840 pCi/g

(maximum ore grade of 0.3% U_3O_8) while typical case ore activity ranges from 5.6 to 14 pCi/g (typical case ore grade of 0.03 to 0.05% U_3O_8). The proportion of mineralized zone samples to all samples is a maximum of 8%. Such samples will not approach the activity level established as the threshold for regulation (2,000 pCi/g) established in 10 CFR 71 (transportation regulations of the U.S. Nuclear Regulatory Commission) and 49 CFR 173 (transportation regulations of the U.S. Department of Transportation). The total sample volume for all three years (refer to Table A.3) would require less space than is available in a pickup truck with an 8 foot bed.

TABLE A.6

Estimated Days of Operation

	YEAR 1		YEAR 2		YEAR 3	
	Drill Holes	Days	Drill Holes	Days	Drill Holes	Days
Area A	30	15	15	7.5	15	7.5
Area B	10	5	15	7.5	15	7.5
Area C	15	7.5	15	7.5	15	7.5
TOTALS	55	27.5	45	22.5	45	22.5

TABLE A.7

Projected Number of Roundtrips

	YEAR 1	YEAR 2	YEAR 3	TOTALS
Personnel Transportation	220	180	180	580
Fuel Tanker	4	4	4	12
Drilling Rig	2	2	2	6
TOTALS	226	186	186	598

Appendix B

FEDERAL DRINKING WATER STANDARDS

TABLE B.1

FEDERAL DRINKING WATER STANDARDS

Arsenic	0.05	milligram/liter
Barium	1.0	milligram/liter
Cadmium	0.01	milligram/liter
Chromium	0.05	milligram/liter
Lead	0.05	milligram/liter
Mercury	0.002	milligram/liter
Molybdenum	0.05	milligram/liter
Nitrogen (in nitrate)	10.0	milligram/liter
Selenium	0.01	milligram/liter
Silver	0.05	milligram/liter
Combined radium-226 and radium-228	5.0	pCi/liter
Gross alpha particle activity (including radium-226 but excluding radon and uranium)	15.0	pCi/liter
Uranium	10.0	pCi/liter

(U.S. Environmental Protection Agency. 1976.
National Interim Primary Drinking Water Regulations)

Appendix C

C1.0 Chronology of Public Involvement

C2.0 Summary of Public Responses

C1.0 CHRONOLOGY OF PUBLIC NOTIFICATION AND REQUESTS FOR PUBLIC INVOLVEMENT WHICH FULFILL REGULATION 1506.6 OF THE NATIONAL ENVIRONMENTAL POLICY ACT.

DATE, ITEM	ESSENTIALS
May 28, 1980 - Direct Mailing of letter to the public	Notification to public that Lomex Corporation submitted plan for exploratory drilling. Requests "comments as to issues and/or concerns"
June 27, 1980 - Direct Mailing of letter to the public	Provided information on the proposed activity and requested input and involvement
June 30, 1980 News Release	"Public Input and Involvement Sought by Los Padres National Forest . . ."
Input receipt card	Sent by District to respondent as input was received
July 19, 1980 News Release	Decision to prepare an Environmental Impact Statement. Referenced official publication of "Notice of Intent."
July 19, 1980 - Direct Mailing of letter to public	Cover letter attached to July 19, 1980, News Release
August 8, 1980 - Direct Mailing of "Notice of Intent" to the public	"Notice of Intent" included notification of public meeting and address for written comments
August 8, 1980 - "Notice of Intent" sent to State and local governments	Including: California Governor's Office of Planning and Research (assigned State Clearinghouse #80081916), San Luis Obispo County Board of Supervisors, Association of Monterey Bay Area Governments, Santa Barbara City-Council Area Planning Council
August 8, 1980 News Release	"Forest Service Files Notice of Intent . . . Public Meeting Scheduled for Santa Margarita Area"
"Notice of Intent" published in Federal Register Vol. 45, No. 160, Friday, August 15, 1980	"Written comments, suggestions and questions concerning the proposed actions should be sent to . . ."
August 26, 1980 Public Meeting	A public meeting held in Santa Margarita Community Hall began at 7:00 p.m. Written comments were collected at the conclusion of the meeting
October 17, 1980 Scoping meeting	Scoping meeting held with Red Wind Foundation, San Luis Obispo County and the Native American Heritage Commission. Community study developed and concerns expressed.
Input receipt card	Sent by Supervisor's Office to respondent as input was received
Continued availability of Forest Service	The Santa Lucia District Ranger and the interdisciplinary team members conducted interviews with media, organizations and individuals. Response to correspondence where appropriate.
September 8, 1981 - Direct mailing of letter to public	"History, Status Report and Projected Timetable"
September 11, 1981 News Release	"Forest Service Reports Progress on Draft Environmental Impact Statement"

C2.0 SUMMARY OF PUBLIC RESPONSES RECEIVED AS OF 28 JULY 1981 TO THE LOMEX CORPORATION'S PROPOSED MINERAL EXPLORATION IN THE NAVAJO VICINITY

Written responses (177) were received in the Forest Supervisor's Office as of 28 July 1981. These responses are available for review by the public in a reading file maintained by the Office of Information, Forest Supervisor's Office.

Comments from the public input were arranged by category and summarized in this report. Essentially most of the comments can be preceded by the phrase "I am concerned about . . ." A brief response by the Forest Service to each issue is included in parenthesis.

ISSUE: AIR QUALITY

- Radiation pollution of the air and atmosphere.
  (Addressed in Section 4.2 and 5.7.)

- The Forest Service study must consider the following: radioactive particulates emitted from each drill hole; cumulative radioactive emissions from all drilled holes; increase in radioactivity above background levels; length of time the air will be exposed to the core samples; length of time each core hole will be open; sum of time all the holes will be open; number of holes to be drilled; study of wind occurrence, direction and speed expected during the time of the proposed operations; study of present background levels of radiation.
  (Addressed in Sections 4.8, 5.2.1, 5.7, 5.7.1, 5.7.2 and Appendix A.)

ISSUE: WATER RESOURCES

GROUNDWATER

- Impacts upon the quality of the water used by local residents and for agricultural purposes.
  (Addressed in Sections 4.3 and 5.3.)

- Uranium tailings contain radioactive materials and, given enough time, will eventually poison our water.
  (Addressed in Sections 4.3 and 5.3.)

- Groundwater contamination caused by water movement through test holes in radioactive soils.
  (Addressed in Sections 4.3, 5.3, 5.7.)

- Groundwater contamination caused by discharge of radioactive drilling muds or drill borings.
  (Addressed in Sections 4.3, 5.3, 5.7, and Appendices A and D.)

- The water of Red Wind community will be contaminated.
  (Addressed in Sections 4.3 and 5.3.)

- Drilling will affect the water table, who controls the water rights?
  (Addressed in Sections 4.3, 5.3, and Appendix D.)

SURFACE WATER

- Contamination of the surface water.
  (Addressed in Sections 4.3 and 5.3.)

- Contamination of the pond which feeds the wildlife in the area.
  (Addressed in Sections 4.3 and 5.3.)

- Disturbance of water courses.
  (Since a road will not be built, water courses are not to be disturbed, therefore this is not an issue.)

- The dangers of radiological and other impacts to surface waters from connecting surface waters with subsurface aquifers by drill holes; any spills of matter brought to the surface from the subsurface environment.
  (Addressed in Sections 4.3, 5.3, and 5.7.)

ISSUE: GEOLOGY AND MINERALS

GENERAL GEOLOGY AND TOPOGRAPHY

- The potential for earthquakes in San Luis Obispo County should be considered.
  (Faults are discussed in Sections 4.4.4.2. However, earthquakes would not affect or be affected by the project and are not an issue.)

MINERAL DEPOSITS

- The present soil radioactivity and the possibility of spills increasing it.
  (Present soil radioactivity discussed in Section 4.4.5. Transportation of samples is addressed in Appendix A.)

- Whether the low percentage of uranium actually recovered warrants the project.
  (Beyond the control of the Forest Service.)

MINING CLAIMS

- Pit, excavation or strip mining, especially in the wooded canyons of Navajo and McGinnis.
  (Since mining is not part of this proposal, this Environmental Impact Statement (EIS) will not address mining.)

- Has Lomex ever been cited for an unsatisfactory safety record?
  (Not relevant for exploration.)

- How quickly will the core holes be capped?
  (Addressed in Appendix A.)

- Backfilling of excavations or borings and disposal of excess backfill.)
  (Discussed in Section 5.7.2 and Appendix D.)

- Will Lomex have legal and financial responsibility for any problems resulting from these

explorations?
(Addressed in Section 2.0.)

- The 1872 Federal mining laws are tragically outdated and do not reflect the present worldwide situation and problems.
(This is beyond the scope of this EIS.)

- The Forest Service is hiding behind the mining laws.
(See laws and regulations addressed in Section 2.0.)

- The policy to give mineral rights is mad.
(See laws and regulations addressed in Section 2.0.)

- Do activities other than test hole drilling projects qualify for perpetuation of claims?
(Yes. However this is beyond the control of the Forest Service. Addressed in Section 2.0.)

- The right to prospect and mine will be violated.
(This right is protected by the 1872 Mining Laws. Discussed in Section 2.1.)

ISSUE: SOILS

- Surface disruption and rehabilitation.
(Addressed in Sections 5.5, 5.11, and Appendix D.)

- The proposed road will require moving an unacceptable amount of soil.
(No road construction is proposed, therefore this is not an issue.)

- Increased access will damage the surface area.
(Discussed in Sections 5.5, 5.11, and Appendix D.)

- Possible erosion due to bulldozing at the site.
(Addressed in Section 5.5, and Appendix D.)

ISSUE: VEGETATION

MAJOR COMMUNITIES

- Adverse impacts on vegetation.
(Addressed in Section 5.6.)

- Effects of radioactive isotopes on plants and animals.
(Addressed in Section 5.6.)

- Contamination of land, water, people, flora and fauna.
(Addressed in Sections 4.8, 5.5, 5.6, 5.7.1, and 5.7.2.)

THREATENED, ENDANGERED, AND SENSITIVE PLANT SPECIES

- Chlorogalum purpureum var. purpureum and Chlorogalum purpureum var. reductum are candidate rare plants believed to be in the area.
(Addressed in Section 4.6.2.)

- Rare and endangered plants such as Chorizanthe rectispina, Buckwheat Family and Fritillaria agrestis, Lily Family.
(Addressed in Section 4.6.2.)

ISSUE: WILDLIFE

GENERAL DESCRIPTION

- The cumulative effects of radiation, pesticides and other chemicals.
(Addressed in Section 5.7. Pesticide use is not relevant.)

- The disruption of the mule deer and black bear habitat.
(See Sections 4.6, 4.7 and 5.6.)

- Destruction of wildlife habitat.
(Addressed in Sections 4.6, 4.7 and 5.6.)

- Pollution of the pond which nourishes the Red Wind Wildlife Sanctuary.
(Addressed in Sections 4.3 and 5.3.)

THREATENED, ENDANGERED AND SENSITIVE SPECIES

- The proposed mining activity by Lomex will disrupt a potentially usable condor site and breeding area.
(No mining is proposed. For information on the Condor, see Sections 4.7.2 and 5.6.)

- Condor, peregrine falcon, and wildflower habitat will be destroyed.
(Addressed in Sections 4.6.1.3, 4.7.2, and 5.6.)

- Irreversible damage to endangered species.
(Addressed in Sections 4.6.1.3, 4.7.2, and 5.6.)

FERAL HORSES

- The survival of the wild horse herd.
(Addressed in Sections 5.4.7.3 and 5.6)

GRAZING

- Molybdenum poisoning of cattle.
(No molybdenum is known in the vicinity.)

- Contamination of grazing land.
(See Sections 4.8, 4.9, 5.6 and 5.7.)

ISSUE: SOCIAL AND ECONOMIC ENVIRONMENT

REGIONAL DEMOGRAPHY AND ECONOMY

- Impacts on the Paso Robles groundwater basin of a possible escape of leaching solution and uranium,

particularly economic losses.
(See Sections 4.3 and 5.3.; no leaching is proposed.)

- The health and welfare of the residents of San Luis Obispo County.
(Covered by more specific concerns, i.e., air, water, etc. See the EIS.)

- Violation of people's rights to a healthful existence.
(Covered by more specific concerns in the EIS.)

- Health hazards from radiation to workers and residents of the immediate area, as well as possible radiation poisoning to others through the food chain.
(Addressed in Sections 4.8, 5.6, and 5.7.)

LAND OWNERSHIP, RESIDENCE AND COMMUNITY CHARACTERISTICS

- Effect of the implementation of the proposal on the health, economic, legal and tribal concerns of the Indians who live in that area.
(Addressed in Sections 5.7 and 5.8.)

- The Native Americans should have sovereign status.
(Addressed in Sections 2.2.2 and 2.3.)

- The new road will not be needed if public easement across Red Wind's property is granted.
(Road construction is not proposed.)

- Access road will infringe upon the Red Wind Foundation's property and violate the rights of these peaceable people.
(Road construction is not proposed.)

RELIGIOUS VALUES

- The land is sacred.
(Addressed indirectly in Sections 4.9.5 and 5.8.)

- The religious freedom of Red Wind and potential violation of their religious practices.
(Addressed in Sections 4.9.5, 5.8, and 5.13.)

- The proposed drilling site is located 1-1/2 miles from Black Mountain, a Native American sacred site nominated for "The California Register of Historic Places."
(Addressed in Sections 4.9.5 and 5.8.)

ISSUE: TRANSPORTATION

- Transportation of equipment and radioactive materials through the area.
(See Section 4.9.4 and Appendix A.)

ISSUE: RECREATIONAL ACTIVITIES

- Will the new road make public lands more accessible to the public for hiking, hunting, fishing, ORV use?
(No road construction is proposed.)

- Protection of the integrity of the recreation area.
(Addressed in Sections 4.10, 5.9, and 5.13.)

ISSUE: RARE II

- Would road construction prejudice the Wilderness viability of any RARE II area?
(RARE II is discussed in Sections 4.11 and 5.10.)

ISSUE: VISUAL ENVIRONMENT

- Aesthetic impacts on the area are potentially significant.
(Discussed in Sections 4.12 and 5.11.)

ISSUE: ARCHEOLOGICAL AND HISTORICAL VALUES

- Effect on archeological/cultural resources, especially ancient Chumash village sites and holy burial grounds.
(Discussed in Sections 4.9.5, 4.13, 5.8, and 5.12.)

- Consideration for the past 100 years in terms of historic and semi-cultural use of the public lands, i.e., preservation of relics of Oriental or Mexican mining activity in the general area.
(Discussed in Sections 4.9.5, and 4.13, 5.8, and 5.12.)

ISSUE: LEGAL AUTHORITY

- How does the Federal Government plan to enforce its ruling?
(Addressed in Section 2.0 and Appendix D.)

- How can Lomex data be corroborated?
(Not relevant for exploration.)

- There should be a steering committee of federal, state, county and community agencies and organizations for this EIS.
(Discussed in Section 2.2.2.)

- What other applications or Permits are required?
(Discussed in Appendix D.)

- Why can't the San Luis Obispo County Board of Supervisors be given full and complete authority to accept or reject permits?
(Discussed in Section 2.0.)

- To what extent will local agencies be able to recommend specific mitigation measures?
(Discussed in Section 2.0.)

- Permit us (the people) to decide if we want to risk contamination.
(Discussed in section 2.0.)

- Since the contamination of the groundwater is the biggest issue, the State Water Resources Control Board or County Environmental Health Department should have jurisdiction.
(Discussed in Section 2.0.)

- The legal challenge should be to the mining laws and regulations, not through the NEPA process.
(This is beyond the control of the Forest Service.)

- A life-threatening proposal such as the Lomex uranium mine is being reviewed and decided by a bureaucratic agency.
(The proposal is for exploration only.)

- How will radioactive tailings and wastes be disposed of?
(Addressed in Section 5.7.2 and Alternative Four.)

- Intolerable noise.
(Addressed in Section 5.13.)

- Danger of fire, toxic fumes, accidents.
(Addressed in Sections 4.15, 5.22, 5.7.)

ISSUES: ISSUES OF BROAD SCOPE

OPINIONS CONCERNING THE IMPACTS OF LA PANZA PROJECT

- Promotion of "profit-oriented" enterprises at the high risk of health hazards and irreversible damage to the environment.

- We are opposed to any uranium drilling or mining on government or private lands.

- You must consider the danger of irreversible damage.

- We just don't want it (mining) if it is possible to prevent it.

- Uranium kills.

- California nuclear facilities could contaminate many of the staple and specialty crops which feed the nation.

- Uranium is used for dangerous purposes.

- Uranium encourages the use of nuclear power which is a destructive method of obtaining energy.

- The benefits of nuclear energy do not outweigh the costs of dismantling plants and disposing of wastes.

- The medical, military, and genetic implications of uranium are the most important issues to face the human race.

- The positive benefits of uranium should be considered.

- Does the Forest Service have the expertise to address all the issues?
(Please refer to "List of Preparers" and Section 2.0.)

ISSUE: SCOPE OF EIS

- The EIS should address and assess the impacts of all the possible courses of action Lomex may propose to take.
(This EIS can only address the proposal and its effects. See Section 2.0.)

- The Environmental Impact Statement should study the full cycle of uranium mining.
(The proposal is for exploration only, see Section 2.0.)

- Withdrawal should be included as a possible alternative.
(Addressed in Section 3.3.2.)

- The effects of the nuclear fuel cycle should be included in analyzing the effects of exploration.
(This is beyond the control of the Forest Service.)

ISSUE: GENERAL IMPACTS TO THE ENVIRONMENT

- Exploration will alter the environment; therefore, all baseline studies needed for evaluating the mining operations should be done before the project is started.
(Addressed in Section 4.0.)

- Environmental pollution, hazards to animals through air, water, and food chain contamination.
(Addressed in Sections 4.2, 4.3, 5.2, 5.3, 5.6.)

- Impacts on the entire Salinas Basin.
(Addressed in sections 4.3 and 5.3.)

- Contamination of the people's land.
(Addressed in Section 5.7.)

- Will any material exit from the core holes?
(Addressed in Section 5.7.1.)

- What is the radiological and chemical content and concentration of wastes generated by drilling?
(Addressed in section 5.7.2.)

Appendix D

MITIGATION MEASURES FOR ALTERNATIVES FOUR AND FIVE

D1.0 Drill Hole Engineering

D2.0 Cuttings Management

D3.0 Management of Off-Site Noise Exposure

D4.0 Cultural Resources

D5.0 Erosion Control

D6.0 Visual Resource Management

D7.0 Duration of Operations

D8.0 Water Quality Monitoring Plan

D9.0 Inspection and Monitoring

Appendix D documents the mitigation measures developed for Alternatives Four and Five. These conditions include provisions for drill hole engineering and practices for mitigation of potential adverse impacts. The additional geophysical study program developed for Alternative Five is documented separately in Appendix F.

D1.0 DRILL HOLE ENGINEERING

Drilling procedures which will differ from procedures proposed in Alternative Three are:

- sealing of the upper annular space
- sealing-off aquifers
- destruction of abandoned wells.

State of California well construction standards (California Department of Water Resources 1968) do not apply to exploration holes, observation wells, or drill holes. However, in the interest of precaution, California standards are referenced in these conditions.

D1.1 Sealing The Upper Annular Space

The space between the well casing and the wall of the drilled hole, or the "annular space", shall be effectively sealed to 20 ft (6 m) to protect against contamination or pollution by surface and/or shallow subsurface waters. This will be done for all drill holes. Sanitary seals will be constructed according to State standards (California Department of Water Resources 1968). A slight increase in cuttings volume will result.

D1.2 Sealing-off Aquifers

If a well penetrates more than one aquifer and any of the aquifers contain water of a quality that, if allowed to mix in sufficient quantity, will result in a significant deterioration of the quality of water in the other aquifer(s), the strata producing such water shall be sealed off to prevent entrance of the water into the well or its migration to other aquifers. Sealing-off will occur within one week of drilling. The one week period will allow for monitoring activities such as water quality study and radioactive logging. Given the nature of the groundwater basin and geologic structure of the area, such conditions are expected to occur only rarely, if at all. Appropriate techniques for sealing off aquifers are indicated in State standards (California Department of Water Resources 1968).

D1.3 Destruction of Abandoned Wells

All new wells will be properly abandoned when the Lomex Corporation's data collection program is completed or upon the completion of other data collection programs. Wells used for observation or monitoring will not be considered abandoned until they are no longer required for data collection by the Lomex Corporation or by the Forest Service or its designated agent. Abandonment shall include destruction procedures designed to prevent the interchange of waters where such interchange will result in a significant deterioration of water quality. Requirements for destroying wells are contained in State of California standards (California Department of Water Resources 1968).

D2.0 CUTTINGS MANAGEMENT

Cuttings determined to be potentially hazardous will be managed in such ways as to reduce hazard of exposure. Potentially hazardous cuttings are defined using the guidance of interim Federal standards for remedial action concerning uranium mill tailings. The interim standards require remedial treatment of radioactive material in which the

> average concentration of radium-226 attributable to [cuttings] from any [drill site] in any 5 cm [1.97 in] thickness of soils or other materials on open land within one foot [30.5 cm] of the surface, or in any 15 cm [5.9 in] thickness below 1 foot, [does] not exceed 5 pCi/gm (40 CFR 192, Remedial Action Standards for Inactive Uranium Processing Sites).

The average concentration of radium-226 can be determined from the sampling program described for Alternative Three at little or no additional cost. A report on average radium-226 level at each new drill site will be provided to the Forest Service at the completion of the sampling program.

Remedial action may include:

- removal of hazardous cuttings to an approved dump site
- burial of cuttings under a layer of soil of such character and thickness to reduce direct gamma radiation to a level within the applicable standard
- mixing of such cuttings with non-hazardous cuttings in grout or cement used in destruction of drill holes.

D3.0 MANAGEMENT OF OFF-SITE NOISE EXPOSURE

In order to mitigate the nuisance effect of early morning and evening noise on residents in the vicinity of Exploration Area B, the following are proposed:

- reduce hours of operation at Area B to 0900 to 1700 on weekdays
- reduce hours of operation at Area B to 1000 to 1700 on Saturdays.

In order to further reduce nuisance effect of noise, the Lomex Corporation will notify all residents by mail of the schedule of operation at least two weeks prior to commencement of work.

D4.0 CULTURAL RESOURCES

All cultural resources will be avoided in order to prevent direct impact. A buffer zone of 9 m (30 ft) will be flagged around each site. Compliance with this avoidance condition will be ensured by a Forest Service monitor.

D5.0 EROSION CONTROL

Management of erosion and siltation will follow the Erosion and Sedimentation Control Policy of the California Regional Water Quality Control Board, Central Coast Region (n.d.), and the applicable "Best Management Practices" established by the Forest Service. The texts of the policy and practices are included in Appendix G.

D6.0 VISUAL RESOURCES MANAGEMENT

Mitigation of visual impacts will be achieved by incorporation of specific required and suggested practices.

Required Practices:

- The upper edge of all cutbanks resulting from pad construction will avoid contrast of forms through slope rounding techniques
- All vegetative clearings will have irregular edges in order to avoid strong line and form contrast
- All trash will be removed daily from drill sites
- Upon termination of each season of work all trash and debris will be removed from the project and all disturbed areas, except those required for access to monitor drill holes, will be finish-graded to blend with adjacent topography. Native or naturalized vegetation will be established on all disturbed areas.

Suggested Practices:

These practices will be employed where consistent with the objectives and requirements of the drilling program.

- Exploration activities should avoid surface disturbance on ridgetops where such disturbance is visible in silhouette against the sky
- Exploration activities should be undertaken in disturbed areas
- Exploration activities should avoid slopes in excess of 50%
- Exploration activities should utilize vegetative and topographic features to provide visual screening
- Exploration activities should cause the least possible surface disturbance
- Access to drill sites should occur on existing roads or tracks where possible.

D7.0 DURATION OF OPERATIONS

Changes in drill hole engineering and reduced hours of operation in Exploration Area B will result in slightly longer annual programs of work.

Drill hole construction and destruction, according to the engineering conditions developed for Alternative Four, are expected to extend drilling time by approximately 20% for the typical well. The typical drill hole without sealing procedures can be completed in about six hours. Therefore, an additional one and one-quarter hours of operation would be required for the typical drill hole.

Shortened hours of operation at Area B (68 hours per week) will extend the period of operations there by approximately one additional operational day per year.

TABLE D.1

Estimated Days of Operation

	YEAR 1	YEAR 2	YEAR 3	TOTALS
Area A	18	9	9	36
Area B	7	10	10	27
Area C	9	9	9	27
TOTALS	34	28	28	90

D8.0 WATER QUALITY MONITORING PLAN

D8.1 Monitoring Sites

Sampling stations have been selected to optimize the development of data relevant (1) to evaluating impacts of exploration activity and (2) to establish an appropriate baseline for potential future mineral development. Sites of the sampling stations are shown in Figure D.1. Sampling stations 1 through 11 were established for this environmental impact statement; stations 12 through 27 are proposed additional sites for Alternative Four. The site location and rationale for site selection follow.

1. Red Wind Foundation Main Well

   a. Location: NE 1/4 of NE 1/4 of Sec. 18, T. 29S., R. 16E.

b. Site selection: Well located in Camatta Creek which drains water from area adjacent to, but not within, Site A. Monitor for quality of the deep groundwater.

2. Pierce Well

a. Location: SE 1/4 of NE 1/4 of Sec. 19, T. 29S., R. 16E.

b. Site selection: Well is located in an area of known mineralization and downstream from old uranium prospect. Site is for long-term monitoring of an area with no current mining activity.

3. Red Wind Big Pond

a. Location: NE 1/4 of NE 1/4 of Sec. 19, T. 29S., R. 16E.

b. Site selection: Dam is in drainage (Camatta Creek) which drains water from area adjacent to, but not within, Site A. This site could be used as a control since it does not drain a project area.

4. Anderson Well

a. Location: SW 1/4 of NE 1/4 of Sec. 29, T. 29S., R. 16E.

b. Site selection: Well is adjacent to Navajo Creek and samples groundwater that is influenced by the creek. Project could affect this well.

5. Navajo Creek

a. Location: SW 1/4 of SE 1/4 of Sec. 20, T. 29S., R. 16E. below junction with McGinnis Creek.

b. Site selection: Sample drains Area B and receives surface water from Navajo and McGinnis Creeks.

c. Measure McGinnis Creek flow above junction with Navajo Creek.

6. Lomex Drill Hole 5-71

a. Location: SW 1/4 of NW 1/4 of Sec. 29, T. 29S., R. 16E.

b. Site selection: Drill hole is in or near mineralized zone and is immediately adjacent to McGinnis Creek (Exploration Area B).

c. Hole drilled in 1971.

7. Lomex Drill Hole 24-77

a. Location: SW 1/4 of NW 1/4 of Sec. 29, T. 29S., R. 16E.

b. Site selection: Drill hole is in or immediately adjacent to mineralized zone (Exploration Area B).

c. Hole drilled 1977.

8. Lomex Drill Hole 36-77

a. Location: SW 1/4 of NW 1/4 of Sec. 29, T. 29S., R. 16E.

b. Site selection: Drill hole is in or immediately adjacent to ore body (Exploration Area B).

c. Hole drilled in 1977.

9. Navajo Creek

a. Location: NW 1/4 of SE 1/4 of Sec. 32, T. 29S., R. 16E.

b. Site selection: Sample is taken from creek above Exploration Area B.

10. Mare Spring

a. Location: SE 1/4 of NW 1/4 of Sec. 21, T. 20S., R. 16E.

b. Site selection: Sample drains groundwater from Exploration Area C.

11. Navajo Creek Stock Pond Well

a. Location: SW 1/4 of SW 1/4 of Sec. 15, T. 29S., R. 16E.

b. Site selection: Well drains Exploration Areas B and C.

12. Spring in Exploration Area A

a. Location: ___ of Sec. 18, T. 29S., R. 16E.

b. Site selection: Sample drains groundwater from Exploration Area A.

13. Surface Water in Exploration Area A

a. Location: ___ of Sec. 18, T. 29S., R. 16E.

b. Site selection: Sample represents surface water from Exploration A.

14. Lomex Drill Hole (new) in Exploration Area A, Upper Slope

a. Location: Forest Service to determine.

b. Site selection: Sample water coming into Exploration Area A.

15. Lomex Drill Hole (new) in Exploration Area A, Lower Slope

    a. Location: Forest Service to determine.

    b. Site selection: Sample water coming out of Exploration Area A.

16. Red Wind Shallow Well

    a. Location: NW 1/4 of NE 1/4 of Sec. 18, T. 29S., R. 16E.

    b. Site selection: Well should pick up surface and shallow subsurface flow in Camatta Creek. This well receives water from Red Wind Big Pond drainage and from a tributary that drains Exploration Area A. The pump is not currently working but it is anticipated that it will be working by spring 1982. The well is approximately 80 feet deep.

17. Lomex Drill Hole (new) in Exploration Area B, Upper Slope

    a. Location: Forest Service to determine.

    b. Site selection: Sample water coming into Exploration Area B.

18. Lomex Drill Hole (new) in Exploration Area B, Lower Slope

    a. Location: Forest Service to determine.

    b. Site selection: Sample water coming out of Exploration Area B.

19. Surface Water in Exploration Area C

    a. Location: NE 1/4 of SW 1/4 of Sec. 21, T. 29S., R. 16E.

    b. Site selection: Sample surface water from Exploration Area C.

20. Lomex Drill Hole (new) in Exploration Area C, Upper Slope

    a. Location: Forest Service to determine.

    b. Site selection: Sample water coming into Exploration Area C.

21. Lomex Drill Hole (new) in Exploration Area C, Lower Slope

    a. Location: Forest Service to determine.

    b. Site selection: Sample water coming out of Exploration Area C.

22. Red Wind Little Pond

    a. Location: NW 1/4 of NE 1/4 of Sec. 18, T. 29S., R. 16E.

    b. Site selection: Pond is a tributary that directly drains Exploration Area A.

The following 5 sites are designed to monitor the quality of surface and groundwater as it flows toward the main channel of San Juan Creek.

23. Camatta Ranch

    a. Location: Sec. 5, T. 29S., R. 16E.

    b. Site selection: Well located in Camatta Creek approximately 3.5 miles downstream from Exploration Area A.

24. Camatta Creek

    a. Location: Forest Service to determine.

    b. Site selection: Well located in Camatta Creek approximately ___ miles downstream from Exploration Area A. Measure water quality of Camatta Creek near its junction with San Juan Creek.

25. Navajo Creek

    a. Location: Forest Service to determine.

    b. Site selection: Well located in Navajo Creek approximately ____ miles downstream from sample 11, Navajo Creek Stock Pond Well.

26. San Juan Creek

    a. Location: Forest Service to determine.

    b. Site selection: Well located in Navajo Creek approximately ____ miles downstream from sample 11, Navajo Creek Stock Pond Well.

27. Camatta Creek - San Juan Creek confluence.

    a. Location: Forest Service to determine.

    b. Site selection: Measure surface water quality of the two creeks where they join the main arm of San Juan Creek.

D8.2 Data Requirements

The standard water quality parameters would include water temperature, stream flow, specific conductance, pH, alkalinity, and hardness.

Parameters which are not standard but which could be affected by the project include radium-226, uranium, gross alpha radiation, and gross beta radiation. A complete list of parameters that would be tested is in Appendix F, Table F.2.

See Appendix B for the current Federal drinking water standards.

D8.3 Monitoring Frequency

The sampling frequency of the water quality parameters will be tested at the time of maximum and minimum dilution. This would occur twice a year or once in the wet season and once in the dry season. The wet season sample would usually be taken in March or April or when hydrologic conditions are such that the surface and subsurface flow is at its maximum; the constituents or parameters would then be at their greatest dilution factor. The dry season sample would usually be taken in May to November or when hydrologic conditions are such that the surface and subsurface flow are at a minimum; the constitutents or parameters would then be at their least dilution factor. The sampling schedule could be modified to account for possible changes in water quality based on hydrological conditions such as extended dry season, drouth, severe wet season, or flooding conditions.

D8.4 Procedures

The collection of the water samples will be based on USGS water quality sampling techniques. This would include the technique of taking a sample from a well, drill hole, spring and surface water, preservation, transportation, laboratory procedures, and quality control measures to be used. "Standard Methods for Examination of Water and Waste Water", 15th edition, (1980), by APHA-AWWA-WPCF, "Methods for Chemical Analysis of Water and Waste", (1974) by the U.S. Environmental Protection Agency, and/or established USGS water analysis techniques will serve as the basis for acceptable water quality analysis.

D8.5 Water Rights

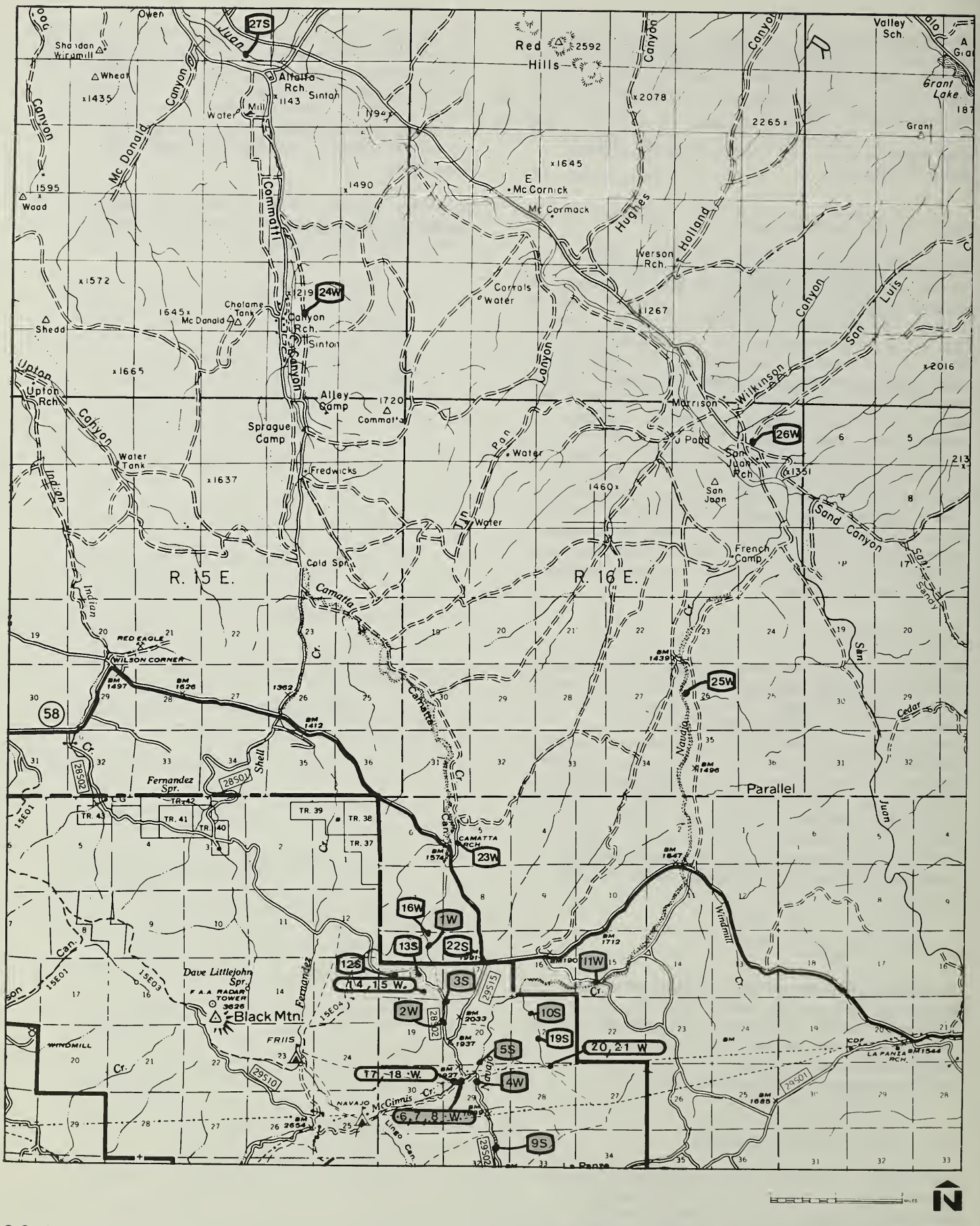
The Lomex Corporation will be responsible for obtaining all necessary water rights for the project. Permits and licenses for appropriation of underground water and surface water would be obtained from the Division of Water Rights, California Water Quality Control Board.

D9.0 INSPECTION AND MONITORING

Forest Service officers will periodically inspect operations to determine whether the Lomex Corporation is complying with Forest Service regulations (36 Code of Federal Regulations 252) and the mitigation measures of the modified Plan of Operations.

If the Lomex Corporation fails to comply with either of the above and such noncompliance is unnecessarily or unreasonably causing injury, loss, or damage to surface resources, the authorized officer shall serve a notice of noncompliance. The notice will describe the noncompliance and will specify corrective action, including a schedule for compliance.

The Lomex Corporation will provide the means to accomplish the water quality monitoring plan described in this Appendix.



S-Surface Sample

W-Well Sample

1980-81 Samples

Additional Sampling Stations (Alternative 4)

Figure D.1 Water Quality Plan

Appendix E

PROGRAM OF ADDITIONAL GEOPHYSICAL STUDY (Alternative Five)

E1.0 Further Geological Reconnaissance

E2.0 Surface Geological Assessment

E3.0 Additional Surface Water Quality Study

E4.0 Additional Subsurface Geophysical, and Geohydrological Assessment

The goal of this program of additional geophysical study is to provide more geological and geohydrological information. The objectives of the study are:

- description of the geologic setting of the groundwater in the study area including rock types, their spatial configurations and distributions, their physical and chemical characteristics, faulting, and shearing
- description of the spatial extent, capacity, and flow characteristics of the aquifer in the study area
- description of mineralization within the area including distribution of uranium in groundwater.

Information pertinent to these objectives would be developed through the following investigation methods and techniques:

- further surface geological reconnaissance
- further surface geophysical assessment
- further surface water quality study
- further subsurface geophysical and geohydrological assessment through drilling.

E1.0 FURTHER GEOLOGICAL RECONNAISSANCE

The program of geological reconnaissance would be an extension of the reconnaissance undertaken for this environmental impact statement.

E2.0 SURFACE GEOPHYSICAL ASSESSMENT

Surface geophysical assessment may include spectrometer surveys, magnetometry, magnetotelluric soundings, seismic refraction and reflection, gravity surveys, galvanic resistivity surveys, radiohm ground surveys, radon soil gas surveys, and radon flux surveys.

E3.0 ADDITIONAL SURFACE WATER QUALITY STUDY

The study would provide for the continuation of the 1980-81 water quality study (eleven sites), and for the additional sites proposed in Alternative 4 (see Appendix D.8.0 and Figure D.1).

E4.0 ADDITIONAL SUBSURFACE, GEOPHYSICAL, AND GEOHYDROLOGICAL ASSESSMENT

The goals of the study require more subsurface investigation. Additional data from drilling would be necessary in Exploration Areas A, B, and C (the specific sites have not been determined at this time). These data are in addition to the program under Alternative Four. It is estimated that an added 30 drill holes would be required to obtain this information. These drill holes would be constructed and abandoned according to the specifications and methods described for Alternative Four (see Appendix D). Tracers would be used for study of groundwater dispersion and flow; such tracers may include water-soluble chloride and sulfate salts and sugars detectable by chemical analysis; strong electrolytes detectable by electrical conductivity; and, detectable radioisotopes.

The additional program of subsurface investigation would require the following:

Exploration Area A:

- Drill and sample up to ten drill holes
- Drill and sample holes in tributary that drains Exploration Area A
- Sample Camatta Creek Windmill Well
- Sample Camatta Creek Ranch Well.

Exploration Area B:

- Drill and sample up to ten drill holes.

Exploration Area C:

- Drill and sample up to ten drill holes.

Appendix F

WELL AND WATER QUALITY DATA, WELL DATA, 1980-1981 WATER QUALITY DATA, AND WATER QUALITY ANALYSIS

F.1 Domestic Well Summary

F.2 Water Quality Data - USGS

F.3 Water Quality Data - USGS - Semiqualitative

F.4 Radiological Analysis

F.5 Chemical Analysis of Ground and Surface Waters

F.6 Water Types and Dissolves-Solids Concentration in the Navajo Vicinity

F.7 Sampling Sites Having Water Quality That Is Not Suitable as Drinking Water

TABLE F.1 Domestic Well Summary

Number	Owner	Elev. (ft.)	Depth (ft.)	Type	Use	Depth to Water (ft.)	Quality Analysis	Remarks:
29A1	Robison	1934	22	dug	aband.	Dry 9/77 1', 4/78	No	Constructed in soft, weathered granite
29B1	Mitchell	1937	125	dr.	dom.	80', 8/75	No	Water reported to contain excessive iron
29B2	Wilson	1837	8±	dug	"	-0-	No	Reported dry, 8/77
29G1	Eller	1937	121	dr.	"	115', 10/77 11.1', 5/78	Yes	Not used as of 5/78
29G2	Anderson	1870	125	dr.	"	15-20', RPT.	No	Reported capable of 400-500 gpd
29H1	Servatius	1975±	125	dr.	"	20', RPT.	No	Drilled in hard granite, inadequate domestic source
29H2	Allen	1935	100	dr.	"	5'±, RPT.	No	Reported hard granite below 25', fair domestic source, pump set @ 16'
29H3	Brown	1925±	65	dr.	"	50', RPT.	No	Inadequate domestic source

TABLE F.2 Water Quality Data - USGS

MARE SPRINGS

WATER QUALITY DATA

DATE	TIME	TEMPERATURE, WATER (DEG C) (00010)	AGENCY ANALYZING SAMPLE (CODE NUMBER) (00028)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	PH LAB (UNITS) (00403)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	HARDNESS (MG/L AS CACO3) (00900)	HARDNESS, NONCARBONATE (MG/L CACO3) (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)
NOV , 1980											
14...	1515	15.0	80020	779	7.0	7.5	.12	350	69	54	52
APR , 1981											
29...	1600	15.0	80020	827	6.8	7.4	.60	370	-- [1]	58	54

[1] a

DATE	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	SODIUM PERCENT (00932)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)
NOV , 1980										
14...	32	.7	16	6.0	36	96	.9	79	2	60
APR , 1981										
29...	32	.7	15	11	39	95	.8	72	2	30

DATE	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	GROSS BETA, DISSOLVED (PCI/L AS CS-137) (03515)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L) (09511)
NOV , 1980										
14...	0	20	--	1	100	190	6	70	7.1	.20
APR , 1981										
29...	10	40	10	10	0	190	40	70	20	.15

DATE	URANIUM NATURAL DISSOLVED (UG/L AS U) (22703)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT) (80030)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90) (80050)	POTASSIUM 40 DISSOLVED (PCI/L AS K40) (82068)	SPECIFIC CONDUCTANCE (MICROMHOS) (90095)	ALKALINITY (MG/L AS CACO3) (90410)	ALKALINITY (MG/L AS CACO3) (95410)	HARDNESS, NONCARBONATE (MG/L CACO3) (95902)
NOV , 1980										
14...	2.7	525	.71	<9.0	6.6	4.5	803	--	280	--
APR , 1981										
29...	1.5	539	--	49	19	8.2	826	290	--	77

REDWIND BIG POND

WATER QUALITY DATA

DATE	TIME	TEMPERATURE, WATER (DEG C) (00010)	AGENCY ANALYZING SAMPLE (CODE NUMBER) (00028)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	SAMPLING DEPTH (M) (00098)	PH FIELD (UNITS) (00400)	PH LAB (UNITS) (00403)	ALKALINITY (MG/L AS CACO3) (00410)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	HARDNESS (MG/L AS CACO3) (00900)	HARDNESS, NONCARBONATE (MG/L CACO3) (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)
JUL , 1980												
16...	1500	28.0	80020	434	--	--	--	190	.01	170	0	24
APR , 1981												
28...	1650	22.0	80020	525	1.0	7.6	7.4	--	.00	190	--	42

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	SODIUM PERCENT (00932)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)
JUL , 1980												
16...	26	39	1.3	33	4.9	31	10	--	19	4	30	0
APR , 1981												
28...	21	35	1.1	28	3.8	32	26	.3	23	2	40	10

DATE	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	GROSS ALPHA, DISSOLVED (PCI/L AS U-NAT) (01515)	GROSS ALPHA, SUSP. TOTAL (PCI/L AS U-NAT) (01516)	GROSS BETA, DISSOLVED (PCI/L AS CS-137) (03515)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137) (03516)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L) (09511)
JUL , 1980												
16...	20	--	70	0	360	6	20	7.5	2.9	8.9	3.9	.08
APR , 1981												
28...	30	<10	140	0	360	40	20	25	.4	10	2.7	.07

DATE	URANIUM NATURAL DISSOLVED (UG/L AS U) (22703)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT) (80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90) (80050)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90) (80060)	POTASSIUM 40 DISSOLVED (PCI/L AS K40) (82068)	SPECIFIC CONDUCTANCE (MICROMHOS) (90095)	ALKALINITY (MG/L AS CACO3) (90410)	HARDNESS, NONCARBONATE (MG/L CACO3) (95902)
JUL , 1980											
16...	17	269	.37	11	4.2	8.5	3.6	3.7	--	--	--
APR , 1981											
28...	26	304	.41	37	.6	9.7	2.7	2.8	485	200	0

NAVAJO CR AB EXPLORATORY AREA

WATER QUALITY DATA

DATE	TIME	TEMPERATURE, WATER (DEG C) (00010)	AGENCY ANALYZING SAMPLE (CODE NUMBER) (00028)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	PH LAB (UNITS) (00403)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	HARDNESS (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)
APR , 1981												
28...	1325	24.5	80020	.13	487	8.1	8.0	.00	200	35	27	26

DATE	SODIUM ADSORPTION RATIO (00931)	SODIUM PERCENT (00932)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)
APR , 1981												
28...	.8	22	1.9	25	39	.3	21	1	50	10	10	<10

DATE	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	GROSS ALPHA, DISSOLVED (PCI/L AS U-NAT) (01515)	GROSS ALPHA, SUSP. TOTAL (PCI/L AS U-NAT) (01516)	GROSS BETA, DISSOLVED (PCI/L AS CS-137) (03515)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137) (03516)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L) (09511)	URANIUM NATURAL DISSOLVED (UG/L AS U) (22703)
APR , 1981											
28...	1	0	270	4	10	5.3	.3	<3.4	<.4	.15	3.8

DATE	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT) (80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90) (80050)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90) (80060)	POTASSIUM 40 DISSOLVED (PCI/L AS K40) (82068)	SPECIFIC CONDUCTANCE (MICROMHOS) (90095)	ALKALINITY (MG/L AS CACO3) (90410)	HARDNESS, NONCARBONATE (MG/L CACO3) (95902)
APR , 1981											
28...	290	.10	.39	<7.8	<.4	<3.2	<.4	1.4	479	190	9

LOMEX WELL #24-77

WATER QUALITY DATA

DATE	TIME	TEMPERATURE, WATER (DEG C) (00010)	AGENCY ANALYZING SAMPLE (CODE NUMBER) (00028)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	PH LAB (UNITS) (00403)	ALKALINITY (MG/L AS CACO3) (00410)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	HARDNESS (MG/L AS CACO3) (00900)	HARDNESS, NONCARBONATE (MG/L CACO3) (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)
JUN , 1980											
05...	1400	19.0	80020	951	7.0	--	220	.12	480	260	93
NOV											
25...	1400	16.0	80020	1910	6.9	7.2	--	.01	1100	700	190
APR , 1981											
28...	0955	17.0	80020	1910	7.2	7.5	--	.00	1100	--	200

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	SODIUM PERCENT (00932)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)
JUN , 1980											
05...	60	43	.9	16	7.8	23	260	.2	20	2	30
NOV											
25...	140	44	.6	8	6.6	52	720	.2	26	3	20
APR , 1981											
28...	140	42	.6	8	7.6	53	720	.3	25	4	30

DATE	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	GROSS BETA, DISSOLVED (PCI/L AS CS-137) (03515)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L) (09511)
JUN , 1980										
05...	0	270	--	180	0	910	<3	50	90	10
NOV										
25...	0	<10	--	100	100	2400	10	160	77	48
APR , 1981										
28...	10	150	52	120	90	1900	30	160	54	51

DATE	URANIUM NATURAL DISSOLVED (UG/L AS U) (22703)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT) (80030)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90) (80050)	POTASSIUM 40 DISSOLVED (PCI/L AS K40) (82068)	SPECIFIC CONDUCTANCE (MICROMHOS) (90095)	ALKALINITY (MG/L AS CACO3) (90410)	ALKALINITY (MG/L AS CACO3) (95410)	HARDNESS, NONCARBONATE (MG/L CACO3) (95902)
JUN , 1980										
05...	194	641	.87	250	86	--	--	--	--	--
NOV										
25...	114	1390	1.89	340	71	4.9	1880	--	350	--
APR , 1981										
28...	120	1410	--	1	50	5.7	1880	360	--	720

ANDERSON WELL

WATER QUALITY DATA

DATE	TIME	TEMPERATURE, WATER (DEG C) (00010)	AGENCY ANALYZING SAMPLE (CODE NUMBER) (00028)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	PH LAB (UNITS) (00403)	ALKALINITY (MG/L AS CACO3) (00410)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	HARDNESS (MG/L AS CACO3) (00900)	HARDNESS, NONCARBONATE (MG/L CACO3) (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)
JUN , 1980											
05...	1640	20.5	80020	541	7.4	--	200	.00	190	0	49
NOV											
14...	1610	13.0	80020	546	7.4	8.0	--	.00	210	6	51
APR , 1981											
30...	0900	19.5	80020	515	7.2	7.9	--	--	190	--	49
SEP											
29...	1600	20.0	80020	532	7.6	8.7	--	.11	200	--	52

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	SODIUM PERCENT (00932)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	ARSENIC DISSOLVED (UG/L AS AS) (01000)
JUN , 1980										
05...	17	38	1.2	30	2.0	25	46	.2	25	1
NOV										
14...	19	34	1.0	26	2.0	30	47	.3	25	1
APR , 1981										
30...	17	40	1.3	31	2.0	24	44	.3	25	1
SEP										
29...	17	34	1.1	27	1.8	29	46	.3	27	0

DATE	BARIUM, DISSOLVED (UG/L AS BA) (01005)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	GROSS BETA, DISSOLVED (PCI/L AS CS-137) (03515)
JUN , 1980										
05...	60	0	40	--	9	0	370	260	40	6.2
NOV										
14...	60	0	<10	--	4	100	370	340	30	6.3
APR , 1981										
30...	60	20	40	30	3	0	370	250	40	7.3
SEP										
29...	63	0	<10	0	17	0	380	430	43	11

DATE	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L) (09511)	URANIUM NATURAL DISSOLVED (UG/L AS U) (22703)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT) (80030)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90) (80050)	POTASSIUM 40 DISSOLVED (PCI/L AS K40) (82068)	SPECIFIC CONDUCTANCE (MICROMHOS) (90095)	ALKALINITY (MG/L AS CACO3) (90410)	HARDNESS, NONCARBONATE (MG/L CACO3) (95902)
JUN , 1980										
05...	.53	19	323	.44	14	6.0	--	--	--	--
NOV										
14...	.38	32	329	.45	33	6.1	--	555	200	--
APR , 1981										
30...	.36	21	323	--	32	7.0	1.5	536	190	3
SEP										
29...	.32	24	323	--	22	11	--	545	190	10

NAVAJO CR BLW MCGINNIS CR

WATER QUALITY DATA

DATE	TIME	TEMPERATURE, WATER (DEG C) (00010)	AGENCY ANALYZING SAMPLE (CODE NUMBER) (00028)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	PH LAB (UNITS) (00403)	ALKALINITY (MG/L AS CACO3) (00410)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	HARDNESS (MG/L AS CACO3) (00900)	HARDNESS, NONCARBONATE (MG/L CACO3) (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)
JUN , 1980												
05...	1715	19.5	80020	--	414	7.6	--	140	.01	160	23	34
APR , 1981												
28...	1445	22.5	80020	.31	412	7.5	7.6	--	.00	180	--	38

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	SODIUM PERCENT (00932)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)
JUN , 1980												
05...	19	24	.8	24	1.2	24	31	.3	23	2	40	0
APR , 1981												
28...	20	25	.8	23	1.0	21	39	.3	22	1	40	10

DATE	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	GROSS ALPHA, DISSOLVED (PCI/L AS U-NAT) (01515)	GROSS ALPHA, SUSP. TOTAL (PCI/L AS U-NAT) (01516)	GROSS BETA, DISSOLVED (PCI/L AS CS-137) (03515)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137) (03516)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L) (09511)
JUN , 1980												
05...	70	--	40	0	200	220	20	<3.3	<.3	3.1	<.4	.03
APR , 1981												
28...	50	<10	10	0	210	40	10	4.3	.3	<2.8	<.4	.06

DATE	URANIUM NATURAL DISSOLVED (UG/L AS U) (22703)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT) (80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90) (80050)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90) (80060)	POTASSIUM 40 DISSOLVED (PCI/L AS K40) (82068)	SPECIFIC CONDUCTANCE (MICROMHOS) (90095)	ALKALINITY (MG/L AS CACO3) (90410)	HARDNESS, NONCARBONATE (MG/L CACO3) (95902)
JUN , 1980												
05...	1.9	241	--	.33	<4.9	<.4	2.9	.4	--	--	--	--
APR , 1981												
28...	1.4	257	.22	.35	<6.3	<.4	<2.6	<.4	.70	422	150	28

NAVAJO CR STOCK PONDWELL

WATER QUALITY DATA

DATE	TIME	TEMPERATURE, WATER (DEG C) (00010)	AGENCY ANALYZING SAMPLE (CODE NUMBER) (00028)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	PH LAB (UNITS) (00403)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	HARDNESS (MG/L AS CACO3) (00900)	HARDNESS, NONCARBONATE (MG/L CACO3) (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)
NOV , 1980											
13...	1420	18.0	80020	583	7.3	7.6	1.7	250	79	60	24
APR , 1981											
29...	1130	20.5	80020	588	7.6	7.4	2.1	240	--	58	22

DATE	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	SODIUM PERCENT (00932)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)
NOV , 1980										
13...	28	.8	20	1.6	22	110	.3	28	2	60
APR , 1981										
29...	27	.8	20	1.6	21	90	.3	27	1	50

DATE	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	GROSS BETA, DISSOLVED (PCI/L AS CS-137) (03515)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L) (09511)
NOV , 1980										
13...	0	30	--	1	100	420	10	20	<2.6	.11
APR , 1981										
29...	0	10	28	<1	0	390	30	20	4.4	.19

DATE	URANIUM NATURAL DISSOLVED (UG/L AS U) (22703)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT) (80030)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90) (80050)	POTASSIUM 40 DISSOLVED (PCI/L AS K40) (82068)	SPECIFIC CONDUCTANCE (MICROMHOS) (90095)	ALKALINITY (MG/L AS CACO3) (90410)	ALKALINITY (MG/L AS CACO3) (95410)	HARDNESS, NONCARBONATE (MG/L CACO3) (95902)
NOV , 1980										
13...	6.0	384	.52	14	<2.4	1.2	588	--	170	--
APR , 1981										
29...	4.3	353	--	<7.6	4.2	1.2	577	160	--	76

WB PIERCE WELL

WATER QUALITY DATA

DATE	TIME	TEMPERATURE, WATER (DEG C) (00010)	AGENCY ANALYZING SAMPLE (CODE NUMBER) (00028)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	PH LAB (UNITS) (00403)	ALKALINITY (MG/L AS CACO3) (00410)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	HARDNESS (MG/L AS CACO3) (00900)	HARDNESS, NONCARBONATE (MG/L CACO3) (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)
JUL , 1980											
16...	1000	19.0	80020	875	7.8	--	220	.11	100	0	18
NOV											
19...	1500	17.0	80020	1020	8.0	8.1	--	.00	160	0	26
APR , 1981											
29...	1330	20.5	80020	1080	7.6	8.1	--	.22	180	--	29

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	SODIUM PERCENT (00932)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)
JUL , 1980											
16...	14	160	6.9	76	4.2	51	130	--	17	4	40
NOV											
19...	23	170	5.9	69	6.2	66	200	.3	18	1	40
APR , 1981											
29...	26	160	5.2	65	5.0	66	210	.4	18	1	40

DATE	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	GROSS BETA, DISSOLVED (PCI/L AS CS-137) (03515)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L) (09511)
JUL , 1980										
16...	0	<10	--	9	0	370	440	50	5.3	.40
NOV										
19...	0	<10	--	10	0	550	380	60	8.1	.49
APR , 1981										
29...	10	10	35	20	0	600	460	60	9.9	.54

DATE	URANIUM NATURAL DISSOLVED (UG/L AS U) (22703)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT) (80030)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90) (80050)	POTASSIUM 40 DISSOLVED (PCI/L AS K40) (82068)	SPECIFIC CONDUCTANCE (MICROMHOS) (90095)	ALKALINITY (MG/L AS CACO3) (90410)	ALKALINITY (MG/L AS CACO3) (95410)	HARDNESS, NONCARBONATE (MG/L CACO3) (95902)
JUL , 1980										
16...	1.0	528	.72	<9.0	5.1	3.1	--	--	--	--
NOV										
19...	1.3	655	.89	<9.6	7.8	4.6	1040	--	240	--
APR , 1981										
29...	1.5	661	--	<15	9.6	3.7	1080	240	--	0

LOMEX WELL #36-77

WATER QUALITY DATA

DATE	TIME	TEMPERATURE, WATER (DEG C) (00010)	AGENCY ANALYZING SAMPLE (CODE NUMBER) (00028)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	PH LAB (UNITS) (00403)	ALKALINITY (MG/L AS CACO3) (00410)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	HARDNESS (MG/L AS CACO3) (00900)	HARDNESS, NONCARBONATE (MG/L CACO3) (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)
JUN , 1980											
05...	1500	20.5	80020	793	7.4	--	240	.10	280	41	46
NOV											
25...	1200	17.0	80020	830	7.3	7.5	--	.00	290	47	47
APR , 1981											
28...	1135	18.5	80020	802	7.7	7.3	--	.02	290	--	47

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	SODIUM PERCENT (00932)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)
JUN , 1980											
05...	40	69	1.8	34	4.9	25	140	.4	29	2	40
NOV											
25...	41	62	1.6	32	4.7	27	150	.3	29	1	40
APR , 1981											
28...	41	62	1.6	32	5.6	24	130	.4	29	5	40

DATE	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	GROSS BETA, DISSOLVED (PCI/L AS CS-137) (03515)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L) (09511)
JUN , 1980										
05...	0	10	--	30	100	930	<3	130	13	12
NOV										
25...	0	50	--	90	100	960	10	120	35	13
APR , 1981										
28...	10	20	<10	70	90	950	4	120	18	11

DATE	URANIUM NATURAL DISSOLVED (UG/L AS U) (22703)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT) (80030)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90) (80050)	POTASSIUM 40 DISSOLVED (PCI/L AS K40) (82068)	SPECIFIC CONDUCTANCE (MICROMHOS) (90095)	ALKALINITY (MG/L AS CACO3) (90410)	ALKALINITY (MG/L AS CACO3) (95410)	HARDNESS, NONCARBONATE (MG/L CACO3) (95902)
JUN , 1980										
05...	13	500	.68	58	13	--	--	--	--	--
NOV										
25...	16	507	.69	80	33	3.5	807	--	240	--
APR , 1981										
28...	16	497	--	83	18	4.2	797	260	--	27

REDWIND DEEP WELL

WATER QUALITY DATA

DATE	TIME	TEMPERATURE, WATER (DEG C) (00010)	AGENCY ANALYZING SAMPLE (CODE NUMBER) (00028)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	PH LAB (UNITS) (00403)	ALKALINITY (MG/L AS CACO3) (00410)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	HARDNESS (MG/L AS CACO3) (00900)	HARDNESS, NONCARBONATE (MG/L CACO3) (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)
JUL , 1980											
16...	1300	22.0	80020	525	7.8	--	130	.00	120	0	40
NOV											
14...	1035	18.5	80020	460	8.1	8.1	--	.16	75	0	27
APR , 1981											
29...	0830	21.5	80020	435	7.8	8.0	--	.41	95	--	33
SEP											
29...	1420	22.0	80020	520	8.0	8.5	--	.12	110	--	37

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	SODIUM PERCENT (00932)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	ARSENIC DISSOLVED (UG/L AS AS) (01000)
JUL , 1980										
16...	3.5	65	2.6	54	3.1	72	19	.2	19	4
NOV										
14...	1.8	69	3.5	66	3.0	67	18	.2	18	2
APR , 1981										
29...	2.9	55	2.5	55	2.7	58	20	.2	18	1
SEP										
29...	3.3	62	2.7	55	2.9	67	16	.5	20	1

DATE	BARIUM, DISSOLVED (UG/L AS BA) (01005)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	GROSS BETA, DISSOLVED (PCI/L AS CS-137) (03515)
JUL , 1980										
16...	60	0	<10	--	8	100	670	30	40	5.8
NOV										
14...	40	0	20	--	5	100	410	<3	30	5.7
APR , 1981										
29...	40	0	<10	29	10	90	450	<3	30	6.9
SEP										
29...	55	0	<10	0	5	0	600	10	45	5.6

DATE	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L) (09511)	URANIUM NATURAL DISSOLVED (UG/L AS U) (22703)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT) (80030)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90) (80050)	POTASSIUM 40 DISSOLVED (PCI/L AS K40) (82068)	SPECIFIC CONDUCTANCE (MICROMHOS) (90095)	ALKALINITY (MG/L AS CACO3) (90410)	HARDNESS, NONCARBONATE (MG/L CACO3) (95902)
JUL , 1980										
16...	.46	9.7	301	.41	13	5.7	2.3	--	--	--
NOV										
14...	.29	3.2	277	.38	15	5.5	--	492	120	--
APR , 1981										
29...	.39	14	264	--	21	6.7	2.0	471	120	0
SEP										
29...	.32	10	288	--	20	5.4	--	540	130	.00

LOMEX WELL # 5-73

WATER QUALITY DATA

DATE	TIME	TEMPERATURE, WATER (DEG C) (00010)	AGENCY ANALYZING SAMPLE (CODE NUMBER) (00028)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	PH LAB (UNITS) (00403)	ALKALINITY (MG/L AS CACO3) (00410)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	HARDNESS (MG/L AS CACO3) (00900)	HARDNESS, NONCARBONATE (MG/L CACO3) (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)
JUN , 1980											
05...	1230	17.0	80020	1730	7.3	--	310	.25	910	600	220
NOV											
25...	1530	15.5	80020	2210	6.6	7.0	--	.00	1600	1400	450
APR , 1981											
28...	0845	16.5	80020	2610	7.0	7.4	--	.01	1600	--	460
SEP											
29...	1730	17.0	80020	2190	7.0	7.8	--	.15	1300	--	350

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	SODIUM PERCENT (00932)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)
JUN , 1980											
05...	88	42	.6	9	8.3	30	670	.5	41	2	40
NOV											
25...	110	41	.5	5	9.3	38	1300	.8	51	8	200
APR , 1981											
28...	120	40	.4	5	8.7	46	1300	.8	43	10	200
SEP											
29...	100	39	.5	6	7.9	31	1000	.9	44	8	100

DATE	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	GROSS BETA, DISSOLVED (PCI/L AS CS-137) (03515)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L) (09511)
JUN , 1980										
05...	0	<10	--	120	100	1000	180	120	120	36
NOV										
25...	0	6100	--	950	100	940	40	140	1200	580
APR , 1981										
28...	10	6300	0	1100	90	990	100	140	1200	640
SEP										
29...	10	3500	0	550	0	960	60	140	960	483

DATE	URANIUM NATURAL DISSOLVED (UG/L AS U) (22703)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT) (80030)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90) (80050)	POTASSIUM 40 DISSOLVED (PCI/L AS K40) (82068)	SPECIFIC CONDUCTANCE (MICROMHOS) (90095)	ALKALINITY (MG/L AS CACO3) (90410)	ALKALINITY (MG/L AS CACO3) (95410)	HARDNESS, NONCARBONATE (MG/L CACO3) (95902)
JUN , 1980										
05...	344	1290	1.75	710	120	--	--	--	--	--
NOV										
25...	1600	2130	2.90	6800	1100	6.9	2440	--	210	--
APR , 1981										
28...	1700	2210	--	4600	1100	6.5	2430	310	--	1300
SEP										
29...	1700	1770	--	2500	920	--	2160	310	--	980

TABLE F.3 Water Quality Data - USGS Semiqualitative

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
CENTRAL LABORATORY, DENVER, COLORADO

WATER QUALITY ANALYSIS
LAB ID # 220040 RECORD # 7951

SAMPLE LOCATION: NAVAJO CR BEL MCGUINESS CR
STATION ID: 2 LAT.LONG.SEQ.: * NONE GIVEN *
DATE OF COLLECTION: BEGIN--790719 END-- TIME--1200
STATE CODE: 06 COUNTY CODE: 079 PROJECT IDENTIFICATION: 479298829
DATA TYPE: 2 SOURCE: SURFACE WATER GEOLOGIC UNIT:
COMMENTS:
ATTN AKERS

CAUTION -- "SQS" ARE SEMIQUANTITATIVE ONLY (SEE FOOTNOTE) -- CAUTION

ALK.TOT(CACO3)	MG/L		170	MAGNESIUM DISS SQS	MG/L		30
ALUMINUM DISS SQS	UG/L		300	MANGANESE DISS SQS	UG/L		50
ANALYZING AGENCY			80020	MOLYBDENUM DISS SQS	UG/L	<	10
ANTIMONY DISS SQS	UG/L	<	30	NICKEL DISSOLVED SQS	UG/L	<	50
BARIUM DISSOLVED SQS	UG/L		50	PH LAB			8.0
BERYLLIUM DISS SQS	UG/L	<	1	POTASSIUM DISS	MG/L		1.5
BISMUTH DISS SQS	UG/L	<	1000	POTASSIUM DISS SQS	DETR.		DELETED
BORON DISSOLVED	UG/L		50	POTASSIUM 40.D.PCI/L			1.1
BORON DISSOLVED SQS	UG/L	<	5	RESIDUE DIS CALC SUM	MG/L	<	304
CADMIUM DISS SQS	UG/L	<	1	RESIDUE DIS TON/AFT		<	0.41
CALCIUM DISS	MG/L		48	SAR			0.8
CALCIUM DISS SQS	MG/L		50	SILICA DISSOLVED	MG/L		28
CHLORIDE DISS	MG/L		31	SILICA DISSOLVED SQS	MG/L		30
CHROMIUM DISS SQS	UG/L	<	50	SILVER DISSOLVED SQS	UG/L	<	10
COBALT DISSOLVED SQS	UG/L	<	5	SODIUM + POTASSIUM	MG/L		29
COPPER DISSOLVED SQS	UG/L	<	10	SODIUM DISS	MG/L		27
FLUORIDE DISS	MG/L		0.3	SODIUM DISSOLVED SQS	MG/L		30
GALLIUM DISS SQS	UG/L	<	30	SODIUM PERCENT			22
GERMANIUM DISS SQS	UG/L		100	SP. CONDUCTANCE LAB			503
HARDNESS NONCARB	MG/L		36	STRONTIUM DISS SQS	UG/L		300
HARDNESS TOTAL	MG/L		210	SULFATE DISS	MG/L		45
IRON DISSOLVED	UG/L		40	TIN DISSOLVED SQS	UG/L		70
IRON DISSOLVED SQS	UG/L		30	TITANIUM DISS SQS	UG/L	<	5
LEAD DISSOLVED SQS	UG/L		700	U.DIS.DIR.FLUOR-UG/L	UG/L		2.3
LITHIUM DISS SQS	UG/L		10	VANADIUM DISS SQS	UG/L	<	10
MAGNESIUM DISS	MG/L		21	ZINC DISSOLVED SQS	UG/L	<	5
				ZIRCONIUM DISS SQS	UG/L	<	5

CATIONS	(MG/L)	(MEQ/L)	ANIONS	(MG/L)	(MEQ/L)
CALCIUM DISS	48	2.395	CHLORIDE DISS	31	0.875
MAGNESIUM DISS	21	1.727	FLUORIDE DISS	0.3	0.016
POTASSIUM DISS	1.5	0.038	SULFATE DISS	45	0.937
SODIUM DISS	27	1.175	ALK.TOT(CACO3)	170	3.397
TOTAL		5.336	TOTAL		5.224

PERCENT DIFFERENCE = 1.06

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
CENTRAL LABORATORY, DENVER, COLORADO

WATER QUALITY ANALYSIS
LAB ID # 220039 RECORD # 7948

SAMPLE LOCATION: LOMEX LOS PADRES ANDERSON WELL
STATION ID: 1 LAT.LONG.SEQ.: * NONE GIVEN *
DATE OF COLLECTION: BEGIN--790719 END-- TIME--1140
STATE CODE: 06 COUNTY CODE: 079 PROJECT IDENTIFICATION: 479298829
DATA TYPE: 2 SOURCE: GROUND WATER GEOLOGIC UNIT:
COMMENTS:
ATTN J AKERS

CAUTION -- "SQS" ARE SEMIQUANTITATIVE ONLY (SEE FOOTNOTE) -- CAUTION

ALK.TOT(CACO3)	MG/L		190	MAGNESIUM DISS SQS	MG/L		10
ALUMINUM DISS SQS	UG/L		300	MANGANESE DISS SQS	UG/L		3
ANALYZING AGENCY			80020	MOLYBDENUM DISS SQS	UG/L	<	10
ANTIMONY DISS SQS	UG/L	<	30	NICKEL DISSOLVED SQS	UG/L	<	50
BARIUM DISSOLVED SQS	UG/L		50	PH LAB			8.1
BERYLLIUM DISS SQS	UG/L	<	1	POTASSIUM DISS	MG/L		2.1
BISMUTH DISS SQS	UG/L	<	1000	POTASSIUM DISS SQS	DETR.		DELETED
BORON DISSOLVED	UG/L		60	POTASSIUM 40.D.PCI/L			1.6
BORON DISSOLVED SQS	UG/L	<	5	RESIDUE DIS CALC SUM	MG/L	<	323
CADMIUM DISS SQS	UG/L	<	1	RESIDUE DIS TON/AFT		<	0.44
CALCIUM DISS	MG/L		50	SAR			1.1
CALCIUM DISS SQS	MG/L		50	SILICA DISSOLVED	MG/L		24
CHLORIDE DISS	MG/L		26	SILICA DISSOLVED SQS	MG/L		30
CHROMIUM DISS SQS	UG/L	<	50	SILVER DISSOLVED SQS	UG/L	<	10
COBALT DISSOLVED SQS	UG/L	<	5	SODIUM + POTASSIUM	MG/L		37
COPPER DISSOLVED SQS	UG/L	<	10	SODIUM DISS	MG/L		35
FLUORIDE DISS	MG/L		0.2	SODIUM DISSOLVED SQS	MG/L		30
GALLIUM DISS SQS	UG/L	<	30	SODIUM PERCENT			28
GERMANIUM DISS SQS	UG/L		100	SP. CONDUCTANCE LAB			535
HARDNESS NONCARB	MG/L		5	STRONTIUM DISS SQS	UG/L		300
HARDNESS TOTAL	MG/L		190	SULFATE DISS	MG/L		54
IRON DISSOLVED	UG/L		60	TIN DISSOLVED SQS	UG/L		70
IRON DISSOLVED SQS	UG/L		30	TITANIUM DISS SQS	UG/L	<	5
LEAD DISSOLVED SQS	UG/L		500	U.DIS.DIR.FLUOR-UG/L	UG/L		17.4
LITHIUM DISS SQS	UG/L		30	VANADIUM DISS SQS	UG/L	<	10
MAGNESIUM DISS	MG/L		17	ZINC DISSOLVED SQS	UG/L		300
				ZIRCONIUM DISS SQS	UG/L	<	5

CATIONS	(MG/L)	(MEQ/L)	ANIONS	(MG/L)	(MEQ/L)
CALCIUM DISS	50	2.495	CHLORIDE DISS	26	0.733
MAGNESIUM DISS	17	1.398	FLUORIDE DISS	0.2	0.011
POTASSIUM DISS	2.1	0.054	SULFATE DISS	54	1.124
SODIUM DISS	35	1.523	ALK.TOT(CACO3)	190	3.796
TOTAL		5.470	TOTAL		5.664

PERCENT DIFFERENCE = -1.75

TABLE F.4 Radiological Analysis

Source	Sample Point	Date	Gross Alpha (pCi/1)	Gross Beta (pCi/1)
Red Wind Foundation*	Main Well Tap	8/8/80	13.4 $\pm$ 2.9	6.9 $\pm$ 1.8
Red Wind Foundation*	Main Well Tap	2/20/81	32.7 $\pm$ 4.5	
Red Wind Foundation**	Main Well Tap	7/16/80	5.8 $\pm$ 4.9	11.0 $\pm$ 3.2

*State of California - Department of Public Health
Radiation Section - Sanitation & Radiation Analysis

**Telegram-Tribune, Atascadero, California, requested LFE Environmental Analysis Laboratories in Richmond, California, to do the analysis.

TABLE F.5 Chemical Analysis of Ground and Surface Waters

Limits--Federal Safe Drinking Water Act--1974	Determination	13377-1 Navajo T.H. 4-77	13377-2 Navajo T.H. 1-73	13377-3 Navajo T.H. 24-77	13377-4 Navajo T.H. 5-73	13377-5 Navajo Creek A	13377-8 29G1
.05	As, mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
1.0	Ba, mg/l	0.08	<0.01	0.11	0.11	0.06	<0.01
?	B, mg/l	0.22	0.14	0.23	0.14	0.18	0.14
.01	Cd, mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
.05	Cr, mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
1.0	Cu, mg/l	<0.01	<0.01	0.01	0.02	<0.01	<0.01
.05	Pb, mg/l	<0.05	<0.05	0.08	<0.05	<0.05	<0.05
.05	Mn, mg/l	0.12	<0.01	0.14	0.01	<0.01	<0.01
.002	Hg, mg/l	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
?	Mo, mg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
?	Ni, mg/l	0.01	<0.01	0.01	<0.01	<0.01	<0.01
---	pH	6.9	6.9	6.9	7.2	7.0	7.3
.01	Se, mg/l	0.020	0.020	0.025	0.015	0.028	0.013
.05	Ag, mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
500	Solids, Dissolved, mg/l	690	240	770	270	190	220
5	Zn, mg/l	0.01	0.01	0.04	0.03	<0.01	0.01
---	U, mg/l	0.005	0.004	0.28	0.036	<0.002	<0.002
5	$Ra^{226} \pm$ Precision*, pCi/l	4.0 ± 1.8	0.2 ± 0.4	14 ± 3	0.4 ± 0.5	0.7 ± 0.7	0.3 ± 0.6

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.

TABLE F.6 Water Types and Dissolves-Solids Concentration in the Navajo Vicinity

Sampling Sites	Water Types[1] by sampling dates: April 28-30, 1981	November 13-14, 19 & 25, 1980	June 5, 1980 or July 16, 1980	Dissolved solids concentrations[2]
Lomex exploratory well 5-71	$CaSO_4$	$CaSO_4$	$CaSO_4$	1880
Lomex exploratory well 24-77	$Mg,Ca,NaSO_4$	$Mg,Ca,NaSO_4$	$Mg,Ca,NaSO_4$	1150
Lomex exploratory well 36-77	$Mg,Na,CaHCO_3$	$Mg,Na,CaHCO_3$	$Mg,Na,CaHCO_3$	501
Navajo Creek above exploratory area	$Mg,Ca,NaHCO_3$			290
Navajo Creek below exploratory area	$Ca,Mg,NaHCO_3$		$Ca,Mg,NaHCO_3$	249
Red Wind big pond	$Ca,Mg,NaHCO_3$		$Mg,Na,CaHCO_3$	286
Pierce's well	$NaHCO_3SO_4,Cl$	$NaHCO_3,SO_4,Cl$	$NaHCO_3$	615
Red Wind main well	$NaHCO_3$	$NaHCO_3$		281
Navajo Creek stock pond well	$Ca,Mg,NaHCO_3$	$CaHCO_3$		368
Anderson's well	$Ca,Na,MgHCO_3$	$Ca,Mg,NaHCO_3$	$Ca,Na,MgHCO_3$	325
Mare Spring	$Mg,Ca,NaHCO_3$	$MgHCO_3$		532

1/ Waters in which no one cation or anion constitutes more than 50 percent of the total cations or anions, listed in order of abundance.

2/ Concentrations are arithmetic means of sampling results from June 1980 to May 1981.

Source: Sylvester, Mark. 1981. Summary of Water Quality Conditions in the Navajo area. Unpublished document. USDI, Geological Survey, Water Resources Division. Menlo Park, California.

TABLE F.7 Sampling Sites having Water Quality that is not Suitable as Drinking Water

Sampling Sites	Constitutents having concentrations in excess of drinking water standards[1]
Lomex Exploratory Well 5-71	Gross alpha, gross beta, radium-226, (all samples)
Lomex Exploratory Well 24-77	Gross alpha, gross beta, radium-226, Pb (all samples)
Lomex Exploratory Well 36-77	Gross alpha, radium-226 (all samples)
Mare Spring	Gross alpha (April 1981 sample)

[1]Drinking water standards (Environmental Protection Agency, 1976) applicable to properties and constituents samples are found in Appendix B.1.

Source: Sylvester, Mark. 1981. Summary of Water Quality Conditions in the Navajo area. Unpublished document. USDI, Geological Survey, Water Resources Division. Menlo Park, California.

Appendix G

INTRODUCTION AND EXCERPTS FROM "WATER QUALITY MANAGEMENT FOR NATIONAL FOREST SYSTEM LANDS IN CALIFORNIA - BEST MANAGEMENT PRACTICES" USDA, FOREST SERVICE

"EROSION AND SEDIMENTATION CONTROL POLICY" OF THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, CENTRAL COAST REGION.

WATER QUALITY MANAGEMENT FOR NATIONAL FOREST SYSTEM LANDS IN CALIFORNIA

Prepared by

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
PACIFIC SOUTHWEST REGION

April 1979

INTRODUCTION

In accordance with the provisions of the State of California Water Resources Control Board (SWRCB)/U.S. Forest Service, Pacific Southwest Region (USFS) Cooperative Agreement #7 042 41-8 of 1977, as amended in 1979, this plan is hereby remitted to the SWRCB. The context of the plan is consistent with the products specified in the agreement, and the jointly developed "Procedural Guide for Section 208 Planning" of February 1978.

The plan addresses water quality management planning for National Forest System lands within the State of California. It is submitted as supportive documentation and input for the preparation of composite Area-wide Waste Treatment Management Plans by the State.

Preparation and submission of this plan is consistent with USFS commitments to environmental planning and protection in accordance with:

- The 1976 USFS interregional Memorandum of Understanding with the SWRCB pertaining to water quality planning.

- The intentions and provisions of the Clean Water Act (P.L. 92-500) Section 208 Area-wide Waste Treatment Management Planning direction.

- Other laws, Executive Orders, and U.S. Department of Agriculture directives that call for the protection and improvement of the environment. (e.g., Multiple Use Sustained Yield Act, National Environmental Policy Act, Forest and Rangeland Renewable Resources Planning Act, National Forest Management Act, E.O. 12088 Federal Compliance with Pollution Control Standards, etc.)

- The USFS land stewardship ethic that calls for management actions to be carried out in a manner that is commensurate with the protection and improvement of all environments, (e.g., physical, biological, social and economic environmental components).

- Maintaining Federal/State comity in regard to mutual environmental interests and continued coordination, cooperation, and understanding.

PRACTICE: 2.2 Erosion Control Plan

OBJECTIVE: To limit and mitigate erosion and sedimentation through effective planning prior to initiation of construction activities and through effective contract administration during construction.

EXPLANATION: Land disturbing activities usually result in at least short term erosion. By effectively planning for erosion control, sedimentation can be minimized. Therefore, within a specified period after award of contract*, the Purchaser (Contractor) shall submit a general plan which, among other things, sets forth erosion control measures. Operations cannot begin until the Forest Service has given written approval of the plan. The plan recognizes the mitigation measures required in the contract.

IMPLEMENTATION: Detailed mitigative measures are developed by design engineers, using an interdisciplinary approach; the measures are reflected in the contract's specifications and provisions.

Contracted projects are implemented by the contractor and/or operator. Compliance with EAR specification and operating plans is assured by the COR, ER, or FSR through inspection.

This practice is required by the referenced directives or contract provisions. It is commonly applied to road construction or timber sales, but should be extended to apply to road construction for mining, recreation, special uses and other roadwork on National Forest lands.

REFERENCES: TSC Provisions B6.31 and C6.3; Public Works specifications 50.2 and 100.42; FSM 7721.54, Amendment 32 (9/78).

RECOMMENDATION: Best Management Practice.

*Presently 60 days per C6.3 on Timber Sale Contracts. A similar plan is required in plans of operations by miners and by permittees on special uses.

PRACTICE: 2.3 Timing of Construction Activities

OBJECTIVE: To minimize erosion by conducting operations during minimal runoff periods.

EXPLANATION: Since erosion and sedimentation are directly related to runoff, scheduling operations during periods, when the probabilities for rain and runoff are low, is an essential element of effective erosion control. Purchasers shall schedule and conduct operations to minimize erosion and sedimentation. Equipment shall not be operated when ground conditions are such that excessive damage will result. Such conditions are identified by the COR or ER with the assistance of a soil scientist or other specialists as needed.

In addition, it is important to keep erosion control work as current as practicable with ongoing operations. Construction of drainage facilities and performance of other contract work which will contribute to the control fo erosion and sedimentation shall be carried out in conjunction with earthwork operations or as soon thereafter as

practicable. The operator should limit the amount of area being graded at a site at any one time, and should minimize the time that an area is laid bare. Erosion control work must be kept current when road construction occurs outside of the normal operating season.

IMPLEMENTATION. Detailed mitigative measures are developed by design engineers, using an interdisciplinary approach and are incorporated into the EAR and contracts.

Forest Service foremen and supervisors are responsible for implementing force account projects to design standards and as specified in the EAR.

Contracted projects are implemented by the contractor or operator. Compliance with plans, specifications, and the operating plan is assured by the COR or ER through inspection.

This practice is required by the referenced directives or contract provisions.

REFERENCES: FSM 7723.5 R-5, Supplement #26 p. 23; TSC Provisions B6.5, B6.6, and C6.31; Standard Specifications 100.42. Also see Practice #2.9.

RECOMMENDATION: Best Management Practice.

PRACTICE: 2.4 Road Slope Stabilization (Preventative Practice)

OBJECTIVE: To improve road cut and fill slope stabilization by applying mechanical and vegetative measures.

EXPLANATION: Few slopes are sufficiently rocky to be naturally stable, without needing additional measures. In most cases mechanical and/or vegetative measures are required.

Mechanical measures include but are not limited to: wattling, erosion nets, terraces, side drains, SVB-surface dewatering devices, blankets, mats, riprapping, mulch, tackifiers, pavement, soil seals, and gunnite.

Vegetation measures include the seedling of herbaceous species (grass, legumes, or browse species) or the planting of brush or trees. Vegetative measures may include fertilization, mulching (or even watering) to insure success. A combination of vegetative species often produces a better result than a more simplistic treatment, e.g., grass seeding alone.

IMPLEMENTATION: Vegetative measures are generally a supplementary device, used to improve the effectiveness of structural measures. They may not take effect for several seasons, depending on the timing of project completion in relation to the growing season.

All measures must be periodically inspected for effectiveness. Additional work may be necessary particularly if the initial attempt to stabilize fails.

Project location, detailed mitigative measures, and management requirements and constraints, are developed in the EAR, using an interdisciplinary approach. These constraints are translated into contract provisions and specifications.

Forest Service foremen and supervisors are responsible for ensuring that force account projects meet design standards, EAR constraints, and mitigative measures.

Contracted projects are implemented by the contractor or operator. Compliance with EAR specifications, and the operating plan, is assured by the COR/ER through inspection. This practice is applied where needed, as recommended by the TSPP and resultant EAR.

REFERENCES: FSM 7721.55, Amendment #32 (9/78); FSM 7705.15 R-5, Supplement 5; FSM 7723.5 R-5, Supplement #26; see Practice 2.5; FSH 2209.23.

RECOMMENDATION: Best Management Practice.

PRACTICE: 2.6 Dispersion of Subsurface Drainage From Cut and Fill Slopes

OBJECTIVE: To minimize the possibilities of cut or fill slope failure and the subsequent production of sediment.

EXPLANATION: Roadways may drastically change the subsurface drainage characteristics of a slope. Since the angle and height of cut and fill slopes increase the risk of instability, it is often necessary to provide subsurface drainage to avoid moisture saturation and subsequent slope failure. Where it is necessary because of slopes, soil, aspect, precipitation amounts, inherent instabililty, etc., one of the following dispersion methods should be used:

1. pipe underdrains
2. horizontal drains
3. stabilization trenches

Dispersal of collected water should be accomplished in an area capable of withstanding increased flows. On erosive soils, energy dissipators need to be placed below pipes carrying large volumes of water. This is a preventive practice.

IMPLEMENTATION: Project location and detailed mitigative measures are determined by the design engineers, using an interdisciplinary approach involving geologist, engineers, soil scientists, and hydrologists.

Forest Service foremen and supervisors are responsible for implementing force account projects to design standards as specified in the EAR.

Contracted projects are implemented by the contractor or timber sale operator. Compliance with

EAR specifications and operating plans is assured by the COR, FSR, or ER.

This practice is applied as necessary as determined by the Forest Service planning process, and documented in the EAR.

REFERENCES: FSM 7723.5 Region 5, Supplement #26 (r/73) p. 10; FSM 7721.52.

RECOMMENDATION: Best Management Practice.

PRACTICE: 2.7 Control of Road Drainage

OBJECTIVE:
- To minimize the erosive effects of water concentrated by road drainage features.
- To disperse runoff from disturbances within the road clearing limits.
- To lessen the sediment load from roaded areas.
- To minimize erosion of the road prism by runoff from road surfaces and from uphill areas.

EXPLANATION: A number of measures can be used (alone or in combination) to control the detrimental effects of road drainage. Methods used to reduce erosion may include such things as properly spaced cross drains or water bars; dips; drop basins; energy dissipators; aprons; downspouts; gabions; debris racks; and armoring of ditches and drain inlets and outlets.

Dispersal of runoff can be accomplished by such means as rolling the grade; outsloping; installation of water spreading ditches; contour trenching; or overside drains; etc. Dispersal of runoff also reduces peak downstream flows and associated high water erosion and sediment transport.

Sediment loads can be reduced by installing such things as: sediment filters; settling ponds; and contour trenches. Soil stabilization can help reduce sedimentation by lessening erosion on borrow and waste areas, on cut and fill slopes, and on road shoulders. Methods for stabilization are outlined in Practice 2.4. Road surface stabilization is outlined in Practice 2.23.

IMPLEMENTATION: Project location, design criteria and detailed mitigative measures are determined during the EAR process using an interdisciplinary approach. These are documented in the EAR.

Forest Service crew foremen and supervisors are responsible for ensuring that force account projects meet design standards, and project EAR criteria.

Contracted projects are implemented by the contractor or operator. Compliance with plans, specifications, and operating plans is assured by the Forest Service COR, ER, or FSR.

This practice is required in contracts when identified as needed in the Forest Service Planning Process.

REFERENCES: "Timber Sale Administration Handbook" (California Region) FSH 2409.23; "Logging Roads and the Protection of Water Quality" (EPA 1975); FSM 7723.5, R-5 Supplement #26 (4/73); FSM 7721.52, Amendment 32 (9/78); FSM 1950; FSH 2533; TSPP; Forest Service Chief's Action Plan for Preconstruction Engineering 7/77.

RECOMMENDATION: Best Management Practice.

PRACTICE: 2.10 Construction of Stable Embankments (Fills)

OBJECTIVE: To construct embankments with materials and methods which minimize the possibility of failure and subsequent water quality degradation.

EXPLANATION: The failure of road embankments and the subsequent deposition of material into waterways may result from the incorporation of slash or other organic matter and from a lack of compaction during the construction of the embankment. As this organic material decomposes, settling of the embankment occurs and the resulting tension cracks allow concentrated infiltration of runoff. Upon reaching saturation, the mass becomes unstable and fails. To minimize this occurrence, the roadway should be designed and constructed as a stable and durable earthwork structure with adequate strength to support the pavement structure, shoulders, and traffic. Proper slope ratio design will promote stable embankments. Embankments shall be constructed of inorganic material and shall be placed by one or more of the following methods:

1. Layer placement
2. Controlled compaction
3. Controlled compaction using density controlled strips
4. Special project controlled compaction

On projects where required densities are specified, some type of moisture-compaction control may be necessary. The outer faces of embankments are often not stabilized, because of difficulty in accessing equipment to finished slopes; such areas are especially liable to erosion and slipping.

IMPLEMENTATION: Project constraints and mitigative measures are developed through the EAR process, using an interdisciplinary approach.

Forest Service crew foremen and supervisors are responsible for implementing force account projects, to design standards and project EAR criteria.

Contracted projects are implemented by the contractor or operator. Compliance with EAR specifications and the operating plan is assured by the COR/ER through inspection.

This practice is required by the reference directives.

REFERENCES: FSM 7721.53, Amendment #32 (9/78); Standard Specification 203.04, 201.03, 201.13; FSM 7723.5, R-5, Supplement #26 (4/73); Practice 2.11.

RECOMMENDATION: Best Management Practice.

EROSION AND SEDIMENTATION CONTROL POLICY

Prepared by

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

GOAL

The goal of the Central Coast Regional Water Quality Control Board (Regional Board) is to reduce and prevent accelerated (man-caused) erosion to the level necessary to restore and protect beneficial uses of receiving waters now significantly impaired, or threatened with impairment, by sediment.

This goal is to be attained through implementation of proper soil management practices. Voluntary implementation is encouraged, but enforcement authority will be exercised where beneficial uses of water are clearly threatened by excessive sediment.

MANAGEMENT PRINCIPLES

Management Principles provide guidelines for Regional Board regulation and control of water pollutants. The following management principles apply to control of erosion and sedimentation:

1. Property owners are considered ultimately responsible for all activities and practices that could result in adverse effects on water quality from waste discharges and surface runoff.

2. Local units of government should have the lead role in controlling land use activities that cause erosion and may, as necessary, impose further conditions, restrictions, or limitations on waste disposal and other activities that might degrade the quality of waters of the state.

3. Best Management Practices (BMP's) should be implemented to reduce erosion and sedimentation and minimize adverse effects on water quality. A BMP is a practice or combination of practices determined by means of an extensive planning process to be the most effective and practicable means to prevent or reduce erosion and sediment related water quality degradation. The following were identified by the Regional Board to be BMP's:

   a. Soil conservation control measures should be used to minimize impacts that would otherwise result from soil erosion. Control measures are identified according to systems, which are then broken down into subsystems of erosion control techniques or component measures. For example, a system for control of erosion from construction sites would identify component measures such as debris basins, access roads, hillside ditches, etc. Other conservation control systems include: conservation cropping; conservation irrigation; roadside erosion control; critical area treatment; diversions and ditches; grade stabilization; pasture and range management; runoff and sediment control ponds and basins; streambank and channel protection; watershed, wildlife, and recreation land improvement, and prescriptive burning and brushland management.

   These control measures are comparable to the USDA Soil Conservation Services' Resource Management Sub-system approach as referenced in the Association of Monterey Bay Area Governments' "Water Quality Management Plan for the Monterey Bay Region", dated July 1978, and in the Association of Bay Area Governments' "Handbook of Best Management Practices", dated October 1977.

   Experience has shown that no one control measure best solves an existing, or prevents a potential, pollution problem - - - especially in the area of soil erosion and sedimentation. As land use, the land user, and various situations change, so does the need for control measures. Before application, an on-site investigation with the land user is necessary to determine which practice or set of practices will be most effective and acceptable.

   b. Erosion control should be implemented in a reasonable manner with as much implementation responsibility remaining with existing local entities and programs as is possible and consistent with water quality goals.

   c. The Regional Board and local units of government should establish a clear policy for control of erosion, including consideration of off-site and cumulative impacts and the imposition of performance standards according to the sensitivity of the area where land is to be disturbed.

   d. Effective ordinances and regulatory programs should be adopted by local units of government. Effective programs would (1) allow only land disturbance activities consistent with the waste load capacity of the watershed; (2) require preparation of erosion and sediment control plans with specific contents and with attention to both off-site/on-site impacts; (3) identify performance standards; (4) be at least comparable to the model ordinance in the "Erosion and Sediment Control Handbook", dated May 1978; and, (5) have provisions for inspection follow-up, enforcement, and referral.

   e. Watersheds with critical erosion and sediment problems should be identified

by one or more concerned agencies such as the California Department of Fish and Game, the Regional Board, the local Environmental Health, Planning, or Engineering Departments, the local Flood Control District, or the Resource Conservation District, and then referred to the remaining agencies by a designated local coordinating agency for determining the scope, nature, and significance of the identified problem. The designated local agency would evaluate the adequacy and appropriateness of the total assessment, including an assessment of the problem and causes, alternatives considered, recommended interim and permanent control measures, and the amount and sources of funding. The evaluation would then be submitted as an Impact Finding Report for consideration and decision by the local governing body.

f. Comprehensive and continuous training should be mandatory for building and grading inspectors, engineers, and planners involved in approving, designing, or inspecting erosion control plans and on-site control measures. The training program would preferably be conducted on an inter-county/agency basis and be administered through a USDA Soil Conservation Service cooperative training arrangement or through seminars conducted by the USDA Soil Conservation Service and the University of California Cooperative Extension. The Soil Conservation Society of America should be requested to assist in establishing an effective training program, including public education to heighten awareness of the adverse effects of erosion and sediment on soil and water resources.

4. In implementing BMP's through local units of government, or through state and federal agencies for lands under their control, working relationships, priorities, and time schedules will be defined in management agency agreements between the areawide waste treatment planning agency and the local management agency. Agreements will be reviewed and updated annually to reflect recent achievements, new information and new concerns.

5. Regional Board participation in sediment control programs shall include assistance in establishment of local control programs, participation in the determination of water quality problems, and a cooperative interfacing with local units of government. Regional Board enforcement authority will be exercised where local volunteer programs fail to correct sediment problems within a reasonable period.

6. Emergency projects undertaken or approved by a public agency and necessary to prevent or mitigate loss of, or damage to, life, health, property, or essential public services from an unexpected occurrence involving a clear and imminent danger are exempt from control providing such exemption is in the public interest.

7. Regulation of sediment discharges from routine annual agricultural operations, such as tilling, grazing, and land grading, and from construction of agricultural buildings is waived except where such activity is causing severe erosion and causing, or threatening to cause, a pollution or nuisance.

8. Regulation of discharges from state and federal lands managed by agencies operating in accordance with approved management agency agreements is waived except where such activity is causing, or threatening to cause, a pollution or nuisance.

PROHIBITIONS

Prohibitions provide the Regional Board's "bottom line" performance standard. They are not subject to staff discretion unless explicitly stated otherwise. Prohibitions are directly enforceable through cease and desist orders. In this instance, all three prohibitions can be satisfied by necessary erosion control planning with the appropriate agency before initiating a sediment-generating activity.

1. Significant soil disturbance activities not exempted pursuant to Regional Board "Management Principles" are prohibited:

   a. In geologically unstable areas,

   b. On slopes in excess of thirty percent (excluding agricultural activities), and

   c. On soils rated a severe erosion hazard by soil specialists (as recognized by the Executive Officer) where water quality may be adversely impacted;

   unless,

   d. In the case of agriculture, operations comply with a Farm Conservation or Farm Management Plan approved by a Resource Conservation District or the USDA Soil Conservation Service;

   e. In the case of construction and land development, an erosion and sediment control plan or its equivalent (e.g. EIR, local ordinance) prescribes best management practices to minimize erosion during the activity, and the plan is certified or approved, and will be

enforced by a local unit of government through persons trained in erosion control techniques; or,

f. There is no threat to downstream beneficial uses of water, as certified by the Executive Officer of the Regional Board.

2. The discharge or threatened discharge of soil, silt, bark, slash, sawdust, or other organic and earthen materials into any stream in the basin in violation of best management practices for logging, construction, and other soil disturbance activities and in quantities deleterious to fish, wildlife, and other beneficial uses is prohibited.

3. The placing or disposal of soil, silt, bark, slash, sawdust, or other organic and earthen materials from logging, construction, and other soil disturbance activities at locations above the anticipated high water line of any stream in the basin where they may be washed into said waters by rainfall or runoff in quantities deleterious to fish, wildlife and other beneficial uses is prohibited.

CONTROL ACTIONS

The following control actions set forth minimal performance criteria with respect to erosion and sedimentation:

1. Erosion from non-point pollution sources shall be minimized through implementation of BMP's (identified under "Management Principles" described above).

2. All necessary control measures for minimizing erosion and sedimentation shall be installed prior to November 15 of each year.

3. All structural and vegetal measures taken to control erosion and sedimentation shall be properly maintained.

4. A filter strip of appropriate width, and consisting of undisturbed soil and riparian vegetation or its equivalent, shall be maintained, wherever possible, between significant land disturbance activities and watercourses, lakes, bays, estuaries, marshes, and other water bodies. For construction activities, minimum width of the filter strip shall be thirty feet wherever possible, as measured along the ground surface to the highest anticipated water line.

5. Design and maintenance of erosion and sediment control structures (e.g., debris and settling basins, drainage ditches, culverts, etc.) shall comply with accepted engineering practices.

6. Cover crops shall be established by seeding and/or mulching, or other equally effective measures, for all disturbed areas not otherwise protected from excessive erosion.

7. Land shall be developed in increments of workable size that can be completed during a single construction season. Graded slope length shall not be excessive and erosion and sediment control measures shall be coordinated with the sequence of grading, development, and construction operations.

8. Use of soil sterilants is discouraged and should be minimized.

Appendix H

GLOSSARY OF TECHNICAL TERMS

Anion - A negatively charged ion that migrates to an anode.

Background level - The naturally occurring level of radiation. "Local background" refers to natural radiation in the project area; "typical nationwide background" refers to typical levels in the United States.

Beneficiation - Improvement of ore quality by removing valueless rock or mineral aggregates.

Cation - a positively charged ion characteristically moving toward a negative electrode in electrolytes.

CFR - Code of Federal Regulations

Concern - A concern is a point of management interest addressed in the NEPA process.

Cosmic radiation - Electrons and the nuclei of atoms, largely hydrogen, that impinge upon the earth from all directions in space with nearly the speed of light.

Curie - A unit of radioactivity defined as that quantity of any radioactive nuclide which has 3.7×10^{10} disintegrations per second; abbreviated Ci.

Cuttings - Rock and earth removed from the ground during the construction of a well.

Daughter product - The immediate product of radioactive decay of a radioactive nucleus, forming either a new isotope or a different chemical element.

dB - Decibel, a unit of intensity of sound.

dB(A) - Refers to sound level in decibels as measured on a sound level meter using the A-weighting network.

Decibel - A unit for measuring the amplitude of a sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to a reference pressure of 20 micropascals.

Dose - The amount of energy imparted by ionizing particles to a unit mass of irradiated material.

Evapotranspiration - Combined loss of water to the atmosphere through movement of water through plants and by evaporation of water from soil or litter surfaces.

f - Femto - 10^{-15}

Federal Land Policy and Management Act of 1976 (43 USC 1714) - FLPMA establishes public land policy and guidelines to provide for the management, protection, development, and enhancement of public lands.

Float - Term used to describe rock detached from parent veins or strata.

Gamma emitters - Radioactive materials which emit gamma rays.

Gamma ray - A high-energy photon, especially as emitted by a nucleus in a transition between two energy levels.

Geotechnical drilling - Research drilling to develop information on subsurface features including hydrology, geology, and mineralogy.

Half-life - The time in which half the atoms of a particular substance undergo radioactive decay. A long half-life implies a low level of radioactivity.

Hectare - Ametric unit of area equal to about 2 and one-half acres.

Impulsive sound - Sound of short duration with an abrupt onset and rapid decay.

Irretrievable - Loss of production, harvest or use of renewable natural resources.

Irreversible - Loss of future options; the use of nonrenewable resources.

In-situ leaching - A method of mineral extraction in which a solution is introduced into an ore body to dissolve the minerals in place. The solution is then recovered and processed.

Intrusive noise - Noise which intrudes over the existing ambient noise at a given site.

Issue - A point of public discussion or interest addressed in the NEPA process.

Isotopes - Atoms that have the same atomic number but different mass numbers.

Joint - Fracture in rock along which no appreciable movement has occurred.

m - milli - 10^{-3}

Magnetometer - An instrument which measures the magnetic field.

Metasediments - Sedimentary rocks which have been altered by heat and/or pressure, e.g., quartzite or marble.

Microrem (R) - One-thousandth of a millirem.

mrem - One-thousandth of a rem or a millirem.

Natural uranium - Uranium whose isotopic composition as it occurs in nature has not been altered.

NEPA process - Those procedures used to comply with the requirements of the National Environmental Policy Act.

Nuclide - Nucleus of an isotope.

Open pit mining - Surface mining in which the ore body is accessed by removal of the overburden.

Opportunity - A condition or situation favorable for attainment of a goal.

P - Pico - 10^{-12}

Percussion drilling - A method of drilling based on a percussion principle in which the rock material at the bottom of a hole is pulverized or broken up by means of a solid-steel cylindrical bit attached to, and working vertically at, the end of a heavy string of steel tools suspended in the hole by a steel cable.

Permeability - The property or capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment of the structure of the medium.

Phreatophyte - Water-loving plants which grow primarily along stream courses where their roots reach into the capillary fringe overlying the water table.

Picocurie (pCi) - One trillionth of a curie. The unit used for environmental measurements of radioactivity. 1 pCi = 2.22 disintengrations per minute.

Piezometer - A device for measuring the hydrostatic pressure at a point in the ground.

Po-210 - Polonium-210; previously called Radium F.

Po-214 - Polonium-214; previously called Radium C_1.

Ra-226 - Radium-226.

Radioactivity - The spontaneous decay of an unstable atomic nucleus into one or more different elements or isotopes. It involves the emission of particles or spontaneous fission until a stable state is reached.

Radionuclide - An atom which exhibits radioactivity and which is characterized by the number of protons, number of neutrons, and energy content in the nucleus, or alternatively by the atomic number, mass number, and atomic mass.

Radon daughters - The four radioactive, short-lived decay products of radon: Polonium-218, Lead-214, Bismuth-214, and Polonium-214.

Rem - Roentgen Equivalent Man.

Revegetated - Establishment of vegetation on disturbed surfaces.

Rn-222 - Radon-222, called radon.

Scoping - The process of determining the scope of an EIS - what will be covered and in what detail. Scoping includes the public, state and local governments as well as affected Federal agencies. Scoping ensures that real problems are identified early and are properly studied, and that issues of no concern do not consume time and effort. Scoping is a process, not an event or a meeting. It continues throughout the planning for an EIS, and may involve a series of meetings, telephone conversations, or written comments from different interested groups.

Secular equilibrium - Radioactive equilibrium in which the parent has such a small decay constant that there has been no appreciable change in the quantity of parent present at the time the decay products have reached radioactive equilibrium.

Sensitive plant - A species being reviewed for Federal classification as a threatened or endangered species.

Specific activity - Radioactivity per unit mass.

Stream order - A geomorphological term. First order streams are the smallest unbranched tributaries; second order streams are initiated by the confluence of two first order streams; third order streams are initiated by the confluence of two second order streams; etc.

Tailings - Waste products from milling operation in which the valuable minerals have been recovered.

Th-230 - Thorium-230, previously termed Ionium.

Th-234 - Thorium-234, previously termed Uranium X_1.

U-234 - Uranium-234, previously termed Uranium II.

U-238 - Uranium-238, previously termed Uranium I.

Underground mining - Various methods of mining referred to as stoping in which the ore body is accessed in underground chambers.

Uranium - The heaviest natural element, radioactive metallic. As found in nature it is a mixture of the isotopes U-235 (0.7%) and U-238 (99.3%).

Working level months - Exposure measured in working level months is the product of the number of working levels in the inhaled air multiplied by the number of working months of exposure, when one working month equals 170 working hours (abbreviated WLM).

Appendix I

EXISTING DRILL HOLES IN THE PROJECT AREA

WELL NO.	DATE DRILLED	DEPTH (ft)	PVC CASING DIA. (in)
A1-71	5/71	± 75	None
A2-71	5/71	100	None
A3-71	5/71	100	None
A4-71	5/71	100	None
A5-71	5/71	100	None
1-71	-/71	65	1.5
2-71	-/71	± 55	1.5
3-71	-/71	48	1.5
4-71	-/71	54.2	1.5
5-71	-/71	± 60	2
6-71	-/71	48	1.5
1-75	11/75	100	1.5
2-75	11/75	120	1.5
3-75	11/75	180	1.5
4-75	11/75	119.5	1.5
5-75	11/75	100	1.5
1-77	10/77	77.5	1.5
2-77	10/77	57	1.5
3-77	10/77	76	1.5
4-77	10/77	78.3	1.5
5-77	10/77	77.4	1.5
6-77	10/77	73.5	1.5
7-77	10/77	73.6	1.5
8-77	10/77	67.3	1.5
9-77	10/77	77.7	1.5
10-77	10/77	57	1.5
11-77	11/2/77	69	1.5
12-77	11/2/77	93	1.25
13-77	11/2/77	78.5	1.5
14-77	11/4/77	61	1.5
15-77	11/4/77	56	1.5
16-77	11/77	117	1.5
17-77	11/77	61.6	1.5
18-77	11/77	46.7	1.5
19-77	11/77	122.5	1.5
20-77	11/77	128	1.5
21-77	11/77	124	1.5
22-77	11/77	58.6	1.5
23-77	11/77	133.4	1.5
24-77	12/77	151.6	1.5
25-77	12/77	129.6	1.5
26-77	12/77	130.1	1.5
27-77	12/77	130	1.5
28-77	12/77	173.8	1.5
29-77	12/77	165	1.5
30-77	12/77	171	1.5
31-77	12/77	154.8	1.5
32-77	12/77	181.1	1.5
33-77	12/77	137.5	1.5
34-77	12/77	125	1.5
35-77	12/77	155	1.5
36-77	12/77	188	1.5
37-77	12/77	196	1.5
38-77	12/77	198	1.5
39-77	12/77	181	1.5
40-77	12/77	182.6	1.5
41-77	12/77	184.5	1.5
42-77	12/77	123	1.25
43-77	12/77	84	1.25
44-77	12/77	--	1.25
45-77	12/77	--	1.25

8.0 BIBLIOGRAPHY

APHA-AWWA-WPCF. 1980.
Standard Methods for Examination of Water and Waste Water. 15th Edition. American Public Health Association, American Water Works Association, Water Pollution Control Federation.

Abshier, J.F., Butterfield, F. Guarnera, B.J., Manrique, A., McEldowney, R.C., and Smith, R.D. 1978.
Exploration Methods and Techniques - An Overview. Mining Engineers. October, 1978 pp. 1417-1419.

Association of Bay Area Governments. c.1978.
Water Quality Management Plan. Environmental Management Plan for the San Francisco Bay Region. Monterey, California.

Association of Monterey Bay Area Governments. 1978.
Water Quality Management Plan for Monterey Bay Area Governments. Monterey, California.

Bailey, Robert V. and Childers, Milton O. 1977.
Applied Mineral Exploration with Special Reference to Uranium. Westview Press. Boulder, Colorado.

Bates, David Y., Murray, James W., and Raudsepp, Valter. 1979.
The Commissioners First Interim Report on Uranium Exploration. The Royal Commission of Inquiry, Health and Environmental Protection, Uranium Mining. British Columbia.

Bates, David V., Murray, James W., and Raudsepp, Valter. 1980a.
Royal Commission of Inquiry Health and Environmental Protection - Uranium Mining Commissioners Report. Volume I. ISBN 0-7718 - 8226-2. British Columbia.

Bates, David V., Murray, James W., and Raudsepp, Valter. 1980b.
Royal Commission of Inquiry Health and Environmental Protection - Uranium Mining. Commissoners Report. Volume II. ISBN 0-7718-8226-2. British Columbia.

Bates, David V., Murray, James W., and Raudsepp, Valter. 1980c.
Royal Commission of Inquiry Health and Environmental Protection - Uranium Mining. Commissioners Report. Volume III. ISBN 0-7718-8226-2. British Columbia.

Bell, M.C. and Bell, Sharon L. 1981.
Possible Effects of Nuclear Power Reactor Accidents on Agriculture. University of Tennessee Agricultural Experiment Station. RR No. 81-11.
Tennessee.

Blaylock, B.G. 1978.
Radioactive Waste. Journal of Water Pollution Control Federation. June, 1978. pp. 1286-1291.

Blaylock, B.G. and Fore, C.S. 1979.
Radioactive Wastes. Journal of Water Pollution Control Federation. 51 (6):1410-1417.

Bowie, S.H. and Cameron, J. 1976.
Existing and New Techniques in Uranium Exploration. Exploration for Uranium Ore Deposits. International Atomic Energy Agency, Proceedings of a Symposium, Vienna, 29 March - 2 April, 1976.

Brownell, G.M. 1957.
Nuclear Radiation in Prospecting. Methods and Case Histories. In Mining Geophysics, 6th Commonwealth Mining and Metallurgy Congress. Canadian Institute of Mining and Metallurgy.

Buchanan, Robert D. c.1980.
Options Open to Decision-Makers: Mitigation Suggestions for Problems Associated with Uranium Development in the San Juan Basin. Working paper #71. San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

Busby, Mark. 1979a.
Surface Water Environment in the San Juan Basin. Working paper #32A. San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

Busby, Mark. 1979b.
Water Use in the San Juan Basin. Working paper #32B. San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

California Association of Resource Conservation. 1979.
Erosion and Sedimentation in California Central Coastal Watersheds: A Study of Best Management Practices. Sacramento, California.

California Department of Conservation. 1978.
Erosion and Sediment Control Handbook. Sacramento, California.

California Department of Water Resources. 1968.
Water Well Standards. Chapter II and Appendixes E, F, and G. From Department of Water Resources. Bulletin 74. Sacramento, California.

California Regional Water Quality Control Board. No date.
Erosion and Sedimentation Control Policy, Central Coast Region. Typescript on file, Los Padres National Forest. Goleta, California.

California Division of Mines and Geology. 1978.
San Luis Obispo Sheet, Geologic Map of California. Sacramento, California.

Cannon, H.L. and Kleinhampl, F.J. 1956.
Botanical Methods of Prospecting for Uranium. Professional Paper 300. USDI, Geological Survey.

Carson National Forest. 1980a.
Environmental Assessment, Phillips Exploration Project. USDA, Forest Service. Taos, New Mexico.

Carson National Forest. 1980b.
Phillips Uranium Proposal Environmental Assessment Appendixes. USDA, Forest Service. Taos, New Mexico.

1. Phillips Uranium Corporation Operating Plan
2. "Mining in National Forests"
3. Uranium Prospecting on National Forest Reserved Public Domain Lands
4. 1974 Regulations - 36 Code of Federal Regulations 252
5. State of New Mexico Bore Hole Plugging Procedures
6. Letters from the State Engineer - Reaffirming the Adequacy of the New Mexico Hole Plugging Procedures
7. Ground Water Rules and Regulation in New Mexico, Article 4
8. Surface Mining of Non-Coal Minerals
9. San Juan Basin Regional Uranium Study Working Paper No. 22
10. Uranium Development in the San Juan Basin Region
11. An Overview of the New Mexico Uranium Industry
12. Uranium in Minnesota - An Introduction to Exploration, Mining, and Milling, pp. 9-13
13. Letter of Documentation of Meeting with the Environmental Improvement Division of the State of New Mexico
14. Letter of Documentation of Meeting with the Environmental Improvement Division Discussing the Environmental Impacts of the Proposed Exploration Drilling
15. Archeological Survey and Clearances by Jon Young, Forest Archeologist
16. EPA Draft Report: Potential Health and Environmental Hazards of Uranium Mine Wastes
17. EPA - Federal Register: Proposed Cleanup Standards for Inactive Uranium Processing Sites
18. Public Issues to be Addressed in the Environmental Assessment Report - El Rito and Canjilon Public Meetings
19. Definition of Terms, Carson National Forest, 1980
20. Resolution of Rio Arriba Board of County Commissioners
21. Record of Open House, Taos, New Mexico; Tres Puedras, New Mexico; Antonito, Colorado
22. Miscellaneous Correspondence.

Cherry, John A. 1979.
Migration in Groundwater of Contaminants Derived from Surface-Deposited Uranium Mill Tailings. Statement of Evidence to the Royal Commission of Inquiry into Uranium Mining. British Columbia.

Colchin, Michael P., Turk, L. Jan, and Humenick, Michael J. 1978.
Sampling of Ground Water Baseline and Monitoring Data for In-Situ Processes. Technical report CRWR-157. EHE 78-01. Center for Research in Water Resources. University of Texas, Austin, Texas.

Compton, Robert R. 1966.
Granitic and metamorphic rocks of the Salinian Block, California Coast Ranges, in Geology of Northern California, Edgar H. Bailey, ed., California Division of Mines and Geology, Bulletin 190:277-287.

Cooley, Maurice E. 1979a.
Effects of Uranium Development on Erosion and Associated Sedimentation in Southern San Juan Basin, New Mexico. Working paper #11A, San Juan Basin Regional Uranium Study. Open File Report 79-1496. USDI, Geological Survey. Albuquerque, New Mexico.

Cooley, Maurice E. 1979b.
Regional Geohydrology of the San Juan Hydrologicic Basin of New Mexico, Colorado, Arizona, and Utah. Working paper #11C. San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

Dibblee, T.W., Jr. 1971.
Geologic Map of the Pozo Quadrangle, California. Open File Map, 15 minute series. USDI, Geological Survey. Washington, D.C.

Dibblee, T.W., Jr. 1976.
The Rinconada and Related Faults in the Southern Coast Ranges, California, and Their Tectonic Significance. Professional Paper 981. USDI, Geologic Survey.

D'Souza, T.J.D. and Mistry, K.B. 1970.
Comparative Uptake of TH-230, Ra-226, Pb-210 and Po-210 by Plants. Radiation Botany. 10: 293-295.

Dobyns, Douglas E. 1980.
Notes. Statement of Evidence Submitted to the Royal Commission of Inquiry into Uranium Mining. British Columbia. March, 1980.

Evans, Thomas J. 1980.
Some Technical Considerations Regarding Uranium Exploration Safety Issues. Miscellaneous Paper 80-2. Geological and Natural History Survey. University of Wisconsin Extension. Madison, Wisconsin.

Fowler, T.W., Blanchard, R.L., and Hans, J.M. 1981.
Health Impact Assessment of Airborne Emissions from Exploratory and Development Boreholes at an Underground Uranium Mine Site. U.S. Environmental Protection Agency, Eastern Environmental Radiation Facility. Montgomery, Louisiana.

Fukushima, Ted T. 1979a.
Ashland Uranium, Inc., Initial Study and Negative Declaration. Unpublished document. California State Lands Commission. Long Beach, California.

Fukushima, Ted. T. 1979b.
Mineral Prospecting Permit W6842-46, W7260 and W7262, Inyo County, California. Initial Study and Negative Declatation. Unpublished document. California State Lands Commission. Long Beach, California.

Gableman, John W. 1976.
Expectations from Uranium Exploration. American Association of Petroleum Geologists Bulletin 60 (11):1993-2004.

Geohydrology Associates Inc. 1978.
Water Budget. Working paper #19. San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

George, Helen. 1979.
Navajo Perceptions and Attitudes towards Uranium Development. Working paper #36. San Juan Basin Regional Uranium Study, USDI, Geological Survey. Albuquerque, New Mexico.

George, Helen. 1980.
Does Uranium Development Mean the Loss of Navajo Tradition and Culture? Working paper #64. San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

Gibson, Lay James. c.1979a.
A. Inter-relationships and Cumulative Effects of Energy Development: A Review of the Literature. B. Addendum to A. Working paper #2. San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

Gibson, Lay James. 1979b.
Infrastructure in Northwestern New Mexico: Future Demand for Housing and the Administrative Geography of Miscellaneous Services Including Recreation, Transportation, and Social Welfare Services with Estimates of Demand through the Year 2000. Working paper #39. San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

Gibson, Lay James and Leonard, Olen. 1980.
Expanded Study of Transportation, Mine Safety, Hispanic Towns, Shiprock and Crownpoint Multipliers and Mental Health: and Responses to Letters of Criticism on Recreation and Water. Working paper #62. San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

Gill, H.S. 1981.
Assessment and Propagation of Noise from Conventional and Quiet Pile Drivers. Southhampton University. England.

Grand Mesa, Uncompahgre, and Gunnison National Forest. 1979.
Final Environmental Statement - Homestake Mining Company's Pitch Project. USDA, Forest Service. Rocky Mtn. Region. Delta, Colorado.

Gray, G. R. and Polk, S.E. 1981.
Exploration Drill Holes Can be Sealed Without Cement. Engineering and Mining Journal. August, 1981.

Greene, M. Wayne and Smith, John H. 1980.
The Chemical Toxicity of Natural Uranium. Statement of Evidence to the Royal Commission of Inquiry into Uranium Mining. British Columbia. April, 1980.

Gross, W.H. 1979.
Some Aspects of Natural Radiation and Background Count. Statement of Evidence to the Royal Commission of Inquiry into Uranium Mining. British Columbia. September, 1979.

Grove, G.R. c.1981.
Unpublished Geological Mapping. Manuscript and notes on file. USDA, Forest Service. Region 5, South Zone Minerals Area Management. San Bernardino, California.

Grutt, E.W. 1969.
Uranium Exploration in Wyoming and New Exploration Techniques. The Mines Magazine. V.59, No. 1, pp. 17-19.

Guarnera, B.J. 1978.
Uranium Exploration Activities in the U.S. Mining Engineering. October, 1978, pp. 1414-1416.

Hart, Earl W. 1976.
Basic Geology of the Santa Margarita Area, San Luis Obispo County, California. California Division of Mines and Geology Bulletin 199.

Hem, John D. 1970.
Study and Interpretation of the Chemical Characteristics of Natural Water, 2nd edition. Paper 1473. USDI, Geological Survey.

Hersloff, L.W. 1981.
Release of Radon-222 from Development Drilling of Uranium. A Paper Presented at the Twenty-Sixth Annual Meeting of the Health Physics Society. June 21-25, 1981.

Hewitt, David. 1980.
Radiation Hazards - the Canadian Experience. Statement of Evidence to the Royal Commission of Inquiry into Uranium Mining. British Columbia. January, 1980.

Hibpshman, Mark C. 1978a.
Mining Projection and Methods. Working paper #31. San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

Hibpshman, Mark C. c.1978b.
Specific Inputs, Activities and Outputs of Uranium Development Activities: Addendum to Working Paper No. 31, Mining Projecting and Methods. Working paper No. 31A. San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

Howard, Charles D.D. 1980.
Surface Water Modeling. Statement of Evidence to the Royal Commission of Inquiry into Uranium Mining. British Columbia. April, 1980.

Humboldt National Forest. 1980.
Environmental Impact Statement, Jerritt Canyon Project - Gold Mine and Mill, Elko County, Nevada. USDA, Forest Service. Nevada.

Jennings, Charles W. 1975.
Fault Map of California with Locations of Volcanoes, Thermal Springs, and Thermal Wells. California Division of Mines and Geology, California Geologic Data Map No. 1.

Johnson, Michael. 1982.
Groundwater Investigations in Northern Monterey County, California-1980. In Preparation. USDI, Geological Survey, Water Resource Investigation. Menlo Park, California.

Jonasson, I.R. 1979.
Relating to an Overview of Concentrations of Uranium, Thorium and Certain of Their Daughter Product to be Found in Earth Materials: Rock, Soil, Sediments and Water and the Relationships Between Them. Statement of Evidence before the Royal Commission of Inquiry into Uranium Mining. British Columbia. September, 1979.

Kennedy, William. 1978.
Physics Primer for Your Vocabulary. Working paper #6, San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

Killough, G.G. and L.R.McKay. 1976.
Methodology for Calculating Radiation Doses from Radioactivity Released to the Environment. ORNL-4992. Oak Ridge National Laboratory. Oak Ridge, Tennessee.

Kuhn, Martin C. 1980.
Tritium and Radiation. Mountain States Mineral Enterprises, Inc. Tucson, Arizona.

Kunkler, J.L. 1979.
A Reconnaissance Study of Selected Environmental Impacts on Water Resources Due to the Exploration, Mining, and Milling of Uraniferous Ores in the Grants, Mineral Belt, Northwestern New Mexico. Working paper #22. San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

Landa, Edward. 1980.
Isolation of Uranium Mill Tailings and their Component Radionuclides from the Biosphere--Some Earth Science Perspectives. Geological Survey Circular 814. USDI, Geological Survey. Arlington, Virginia.

Langmuir, Donald. 1979.
Factors Affecting the Behavior and Migration of Radium and Thorium Related to Seepage from Uranium Tailings. Statement of Evidence to the Royal Commission of Inquiry into Uranium Mining. British Columbia.

Langmuir, Donald. 1979.
Geochemical Controls on Uranium Concentrations in Natural Waters. Statement of Evidence to the Royal Commission of Inquiry into Uranium Mining. British Columbia.

Laughton, Graeme R. 1979.
Flexible Linings in North American Uranium Projects. Australian Mining. April, 1979.

Lomex Corporation. 1978.
La Panza Project, A Solution Mining Proposal. Unpublished plan. New York, New York.

Lomex Corporation. 1980.
Plan of Operations, Navajo Prospecting Project, San Luis Obispo County, California. Unpublished document. New York, New York. March - October, 1980.

Los Padres National Forest. 1979a.
Santa Lucia Ranger District Multiple Use Plan. Unpublished document. USDA, Forest Service. Goleta, California.

Los Padres National Forest. 1979b.
Black Mountain Wild Horse Environmental Assessment. Santa Lucia Ranger District. Unpublished document. USDA, Forest Service. Goleta, California.

Los Padres National Forest. 1981.
Slope Stability Map: Camatta Ranch 7.5 Minute Map. Unpublished annotated map compiled by G.R.Grove. USDA, Forest Service. Goleta, California.

Los Padres National Forest. 1982.
Third Order Soils Resource Inventory, Main Division. Manuscript in preparation. USDA, Forest Service. Goleta, California.

Lyford, Forest P. and Frenzel, Peter F. 1979.
Ground Water in the San Juan Basin, New Mexico and Colorado: The Existing Environment. Working paper #23. San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

Michelson, Robert A. 1966.
Prospecting for Uranium. Mineral Industries Bulletin. Colorado School of Mines, V.9, No. 4.

Miller, Henry. 1977.
Radiation Exposures Associated with Surface Mining for Uranium. Health Physics. 32:523-527.

Minnesota (State of). 1980.
State of Minnesota Exploration Monitoring Program. Unpublished document. St. Paul, Minnesota.

Minnesota (State of). 1980.
Statutes-Chapter 156A Water Wells Exploratory Boring. St.Paul Minnesota.

Minnesota (State of). 1981.
7MCAR 1.225-Rule Relating to Explorers and Exploratory Borings. St. Paul, Minnesota.

Minnesota Department of Natural Resources. 1980a.
Uranium Bibliography. Unpublished Document. St. Paul, Minnesota.

Minnesota Department of Natural Resources. 1980b.
Uranium: A Report on the Possible Environmental Impacts of Exploration, Mining, and Milling in Minnesota. St. Paul, Minnesota.

Minnesota Environmental Quality Board. 1981.
Uranium Exploration, Mining, and Milling in Minnesota - a Review of the State's Regulatory Framework. Prepared for the Minnesota State Legislature. St. Paul, Minnesota.

Moffett, D. and Tellier, M. 1977.
Uptake of Radioisotopes by Vegetation Growing on Uranium Tailings. Canadian Journal of Soil Science. SF: 417-424.

Moffett, D. and M. Tellier. 1978.
Radiological Investigations of an Abandoned Uranium Tailings Area. Journal of Environmental Quality. 7(3):310-314.

Myers, John P. and Adcock, Larry. 1979.
Direct and Indirect Economic Impact of the Uranium Industry in the San Juan Basin. Working paper #46. San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

Nash, Thomas J. 1978.
Preface: Uranium Geology in Resource Evaluation and Exploration. Economic Geology. Society of Economic Geologist. 73 (8):1401-1407.

National Council on Radiation Protection and Measurements. 1975.
Natural Background Radiation in the United States. NCRP Report No. 45. Washington, D.C.

Nelson, John D. 1979.
Overview Seepage Control. Statement of Evidence to the Royal Commission of Inquiry into Uranium Mining. British Columbia.

O'Hare, James. 1981.
Soils Technical Report, Navajo Mineral Exploration Project. Santa Lucia Ranger District, Los Padres National Forest. On file. USDA, Forest Service. Goleta, California.

Otton, James K. 1976.
Uranium and Trace Elements in Stream Sediments as an Exploration Tool. Geological Survey Open File Report 76-220. USDI, Geological Survey.

Overmyer, Robert F., Rogers, Vern C., and Jensen, Craig M. 1979.
Reduction of Radon Flux from Uranium Tailings. Mining Congress Journal. September, 1979. pp. 21-25.

Pacific Northwest Laboratories. 1980.
Critical Biological Pathways for Transfer of Radioactive and Heavy Metal Contaminants to Biota and Man in Relation to Development of the Uranium Industry in British Columbia. Final Report to Royal Commission of Inquiry into Uranium Mining. Richland, Washington.

Page, Lincoln R., Stocking, Hobart E., and Smith, Harriet. 1955.
Contributions to the Geology of Uranium and Thorium by the United States Geological Survey and Atomic Energy Commission for the United Nations International Conference on Peaceful Uses of Atomic Energy. Geneva, Switzerland, 1955. Professional Paper 300. USDI, Geological Survey. Washington, D.C.

PRC Toups Corporation. 1979.
Overview Summary: Ecological Impact of Uranium Development in San Juan Basin Area. Working paper #54. San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

Rogers, Deborah. 1980.
Potential Radiation Releases from Exploratory Drilling. Technical paper. Center for Alternative Mining Development Policy. Madison, Wisconsin.

Root, Thomas E. 1978.
Environmental Law Aspects of Extracting and Processing Uranium. Natural Resources Lawyer. 11(3):419-454.

Ross, Donald C. 1972.
Petrographic and Chemical Reconnaissance Study of Some Granitic and Gneissic Rocks near the San Andreas Fault from Bodega Head to Cajon Pass, California. Professional Paper 698. USDI, Geological Survey.

San Luis Obispo County. 1894.
Map of South Branch of California Canyon and San Jose Road, Road District 9. San Luis Obispo, California.

San Luis Obispo County. 1976.
San Luis Obispo County Noise Element. San Luis Obispo, California.

Santa Barbara County Planning Department. 1978.
Noise Easement of Comprehensive Plan. Santa Barbara, California.

Santa Fe National Forest. 1981.
Plan of Operations - SOHIO Western Mining Co., Environmental Assessment, Coyote Ranger District, USDA, Forest Service. Coyote, New Mexico.

Saum, N.M. and Link, J.M. 1969.
Exploration for Uranium, Part 1. Colorado School of Mines. Mineral Industries Bulletin. V.12 No. 4.

Sayre, W.W., Guy, H.P., and Chamberlin, A.R. 1963.
Uptake and Transport of Radionuclides by Stream Sediments. Professional Paper 433-A. USDI, Geological Survey, and U.S. Atomic Energy Commission. Washington, D.C.

Schiager, K. 1974.
Analysis of Radiation Exposures On or Near Uranium Mill Tailings Piles. Radiation Data and Reports.

Schiager, Keith J. c.1979.
Radiological Impact Assessment. Working paper #40. San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

Sorenson, Jay B. and Marston, Karen L. c.1979.
Uranium Mining and Milling and Environmental Protection: Mitigation of Regulatory Problems. Working paper #35. San Juan Basin Regional Uranium Study. USDI, Geological Survey. Albuquerque, New Mexico.

Stevens, D.N., Rouse, G.E., and DeVoto, D.H. 1971.
Radon-222 in Soil Gas: Three Uranium Exploration Case Histories in the Western United States. Canadian Institute of Mining and Metallurgy. Special Volume No. 11, pp. 158-264.

Summers, W.K. 1972.
Factors Affecting the Validity of Chemical Analysis of Natural Water. Ground Water. Vol. 10, No. 2, March-April 1972. pp. 12-17.

Swing, Jack W. 1975
Estimation of Community Noise Exposure in Terms of Day-Night Average Level Noise Contours. Draft Report, Office of Noise Control, State of California Department of Health. Berkeley, California.

Sylvester, Mark A. 1981.
Summary of Water Quality Conditions in the Navajo Area. Unpublished document. USDI, Geological Survey, Water Resources Division. Menlo Park, California.

Thatcher, L.L., Janger, V.J., and Edwards, K.W. 1977.
Methods for Determination of Radioactivity Substance in Water and Sediments. Techniques of Water-Resources Investigations. Book 5, Chapter A5. USDI, Geological Survey.

Thompson, W.E., Swarzenski, W.V., Warner, D.L., Rouse, G.E., Carrington, O.F., Pyrit, R. 1978.
Ground Water Elements of In-Situ Leach Mining of Uranium. NUREG/CR-0311. U.S. Nuclear Regulatory Commission. National Technical Information Service. Springfield, Virginia.

Todd, David Keith. 1980.
Groundwater Hydrology. Second Edition. John Wiley and Sons. New York, New York.

U.S.Bureau of Mines. 1977.
Status of the Mineral Industries. U.S. Government Printing Office. Washington, D.C.

U.S. Congress, Office of Technology Assessment. 1979.
Management of Fuel and Nonfuel Minerals in Federal Lands. U.S.Government Printing Office. Washington, D.C.

U.S. Department of Agriculture. 1977.
National Handbook of Conservation Practices. Soil Conservation Service. Washington, D.C.

U.S. Department of Agriculture. 1979.
Water Quality Management for National Forest System Lands in California. Forest Service, Pacific Southwest Region. April, 1979.

U.S. Department of Energy. 1981.
Airborne Gamma-Ray Spectrometer and Magnetometer Survey. San Luis Obispo County California. Grand Junction, Colorado.

U.S. Department of the Interior, Fish and Wildlife Service. 1980.
Proceedings of the Uranium Mining and Milling Workshop. Edited by Gerald C. Horak and James E. Olson. FWS/OBS-80/57. Fish and Wildlife Service. August, 1980. Fort Collins, Colorado.

U.S. Environmental Protection Agency. 1972.
Estimates of Ionizing Radiation Doses in the United States 1960-2000. Office of Radiation Programs. Rockville, Maryland.

U.S. Environmental Protection Agency. 1973.
Investigations of Fugitive Dust - Sources, Emissions, and Control. Publication T.D. - 1582. Research Triangle Park, North Carolina.

U.S. Environmental Protection Agency. 1974.
Methods for Chemical Analysis of Water and Waste. Technology Transfer. Washington, D.C.

U.S. Environmental Protection Agency. 1976.
National Interim Primary Drinking Water Regulations. Washington, D.C.

U.S. Environmental Protection Agency. 1980a.
Draft Environmental Impact Statement for Remedial Action Standards for Inactive Uranium Processing Sites. EPA 520/4-80-011. Office of Radiation Programs. Washington, D.C.

U.S. Environmental Protection Agency. 1980b.
Proposed Ground Water Protection Strategy. EPA-11-1980. Office of Drinking Water. Washington, D.C.

U.S. Environmental Protection Agency. 1980.
Population Risks from Uranium Ore Bodies. Office of Radiation Programs. Washington, D.C.

U.S. Environmental Protection Agency. 1981. Radiological Survey of the Lomex Corporation La Panza Prospecting Project. Unpublished document. Office of Radiation Programs. Las Vegas, Nevada.

U.S. Forest Service. 1979. Final Environmental Statement, Roadless Area Review and Evaluation (RARE II). USDA. Washington, D.C.

U.S. General Accounting Office. 1979. Cleaning Up Commingled Uranium Mill Tailings: Is Federal Assistance Necessary? PB-290-865. Feb. 5, 1979. Department of Commerce. National Technical Information Service. Washington, D.C.

U.S. General Accounting Office. 1981. Problems in Assessing the Cancer Risks of Low-Level Ionizing Radiation Exposure. Vol. 1. Deptartment of Commerce. Washington, D.C.

U.S. Interagency Task Force on the Health Effects of Ionizing Radiation. 1979. Report of the Task Force. Department of Health, Education and Welfare. Washington, D.C.

U.S. Mine Safety and Health Administration. 1979. Radiation Monitoring. U.S. Government Printing Office. Washington, D.C.

U.S. Nuclear Regulatory Commission. 1977a. Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes. Vol. 1, NUREG-1070, Docket NO. PR 71, 73 (40 FR 23768). Office of Standards Development. National Technical Information Service. Springfield, Virginia.

U.S. Nuclear Regulatory Commission. 1977b. Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes. Vol. 2, NUREG-1070, Docket NO. PR-71, 73 (40 FR 23768). Office of Standards Development. Springfield, Virginia.

U.S. Nuclear Regulatory Commission. 1978. Final Environmental Statement Related to the Wyoming Mineral Corporation Irigaray Uranium Solution Mining Project. NUREG-0481. Docket No. 40-8502. Office of Nuclear Material. National Technical Information Service. Springfield, Virginia.

U.S. Nuclear Regulatory Commission. 1979. Final Environmental Statement Related to the Operating of Shootering Canyon Uranium Project. NUREG-0583. Docket No. 40-8698. Office of Nuclear Material. National Technical Information Service. Springfield, Virginia.

U.S. Nuclear Regulatory Commission. 1980a. Final Generic Environmental Impact Statement on Uranium Milling Project M-25 (Summary and Text). Vol. 1. Office of Nuclear Material. Springfield, Virginia.

U.S. Nuclear Regulatory Commission. 1980b. Final Generic Environmental Impact Statement on Uranium Milling Project M-25. (Appendixes A-F). Vol. II. Office of Nuclear Material. Springfield, Virginia.

U.S. Nuclear Regulatory Commission. 1980c. Final Generic Environmental Impact. Statement on Uranium Milling Project M-25. (Appendixes G-V). Vol. III. Office of Nuclear Material. Springfield, Virginia.

U.S. Nuclear Regulatory Commission. 1981a. Draft Environmental Impact Statement on 10 CFR Part 6 "Licensing Requirements for Land Disposal of Radioactive Waste" Summary. Vol. I. NUREG-0782. Office of Nuclear Regulatory Commission. Washington, D.C.

U.S. Nuclear Regulatory Commission. 1981b. Draft Environmental Impact Statement on 10 CFR Part 61 "Licensing Requirements for Land Disposal of Radioactive Waste" Main Report. Vol. II. NUREG-0782. Office of Nuclear Regulatory Commission. Washington, D.C.

U.S. Nuclear Regulatory Commission. 1981c. Draft Environmental Impact Statement on 10 CFR Part 61 "Licensing Requirements for Land Disposal of Radioactive Waste". Appendixes A-F. Vol. 3. NUREG-0782. Office of Nuclear Regulatory Commission, Washington, D.C.

U.S. Nuclear Regulatory Commission. 1981d. Draft Environmental Impact Statement on 10 CFR Part 61 "Licensing Requirements for Land Disposal of Radioactive Waste". Appendixes G-Q. Vol. 4. NUREG-0782. Office of Nuclear Regulatory Commission. Washington, D.C.

Urban Land Institute. 1978.
Resident Erosion and Sediment Control.
Washington, D.C.

Watson, James E., Jr., Ed. 1979.
Low-level Radioactive Waste Management. Health
Physics Society Midyear Topical Symposium
Proceedings. 12. Williamsburg, Virginia. Feb.
11-15, 1979.

Wenrich-Verbeek, Karen J. 1976.
Water and Stream-Sediment Sampling Techniques for
Use in Uranium Explorations. Open-File Report
76-77. USDI, Geological Survey.

Wisconsin Legislative Council. 1980.
Memorandum on Government Moratoria on Exploration
for Uranium. Madison, Wisconsin.

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